

AVIATION WEEK

A MCGRAW-HILL PUBLICATION

OCT. 29, 1951

50 CENTS



Gas Turbine Thermocouples by **BG**

Developed and produced specifically to meet the performance requirements of Gas Turbine engines, BG thermocouples provide the maximum in performance and durability as well as ready accessibility, so important for economical maintenance.

Now in use in aircraft for the military services, these BG Thermocouples are giving exceptional performance under the most rugged operating conditions.

For information on BG products, write:

THE **BG** CORPORATION
136 WEST 52nd STREET,
NEW YORK 19, N. Y.





When the "bacon and eggs" come by air...



STANDARD SKYWAY SERVICE

Everywhere on the Midwest
 Standard Aviation Gasoline • STANDARD
 Aviation Engine Oil • STANDARD Aviation
 Lubricants and Hydraulic Oils • CRASH
 ROAD Aero Engine Oils

When heavy snows close Montana roads, travelers in the vicinity of Miles City know they won't have long to wait before food is on the way by air. Flying supplies to snowbound ranches and dropping feed for snowbound livestock is one of the services performed by pilots who base their ships at bustling Miles City Airport.

Planes of scheduled airlines and flying ranchers are among the 600 ships using the field's 5,600-foot hard surfaced runways and paved taxi strips every month. The field also boasts a complete lighting system, a weather station—and Standard Oilway Service. Miles City Aero Service is a 'round-the-clock operation with maintenance facilities to handle everything from light planes to C-46's. Manager Big Olyn reports, "We depend on Standard Oil Aviation Products 100 percent. That's one reason our customers know they can depend on Aero Service."

STANDARD OIL COMPANY (INDIANA)

Did you ever see a dream FLYING?



Take a look
 at the new
 Kidde Compressor...

The new Kidde compressor is really the dream of pneumatics engineers come true. It provides plenty of pressure at 55,000 feet (from ambient pressure one cfm of free air compressed to 3,000 psi). At sea level it will deliver four cfm of free air compressed to 3,000 psi.

This powerful new compressor is already being installed in the planes of a leading aircraft company. The above illustration shows it being driven by a hydraulic motor but electric or pneumatic drive is equally effective.

The light weight and reliable performance of this new four-stage compressor make it well worth your consideration. Call us for full data on this or other Kidde pneumatic devices for aircraft use.



Kidde

Walter Kidde & Company, Inc., 1018 Main Street, Belleville 9, N. J.

Walter Kidde & Company of Canada, Ltd., Montreal, P. Q.

Titeflex

ALL-METAL
FLEXIBLE TUBING



Dozens of
Aircraft Applications

Because it is made entirely from metal, Titeflex possesses the strength of metal, but is easy to bend, coil, remove, clean, change and connect. Yet it has the added quality of flexibility to isolate vibration and cushion vibration.

Titeflex tubing is manufactured from brass, stainless steel, aluminum, steel and copper for a variety of aircraft applications. Some of the uses: 1. Fuel lines, 2. Hydraulic lines, 3. Air Lines, 4. Instrument Connections, 5. Oxygen Lines. Many of these are furnished complete in standard production - or are made to order with work shop to develop new designs.

WRITE TODAY FOR SPECIAL AIRCRAFT QUOTATION

Titeflex, Inc.
517 Philadelphia Ave. Newark 5, N. J.
SPECIALISTS IN AIRCRAFT, AUTOMOTIVE
AND MARINE FLIGHT HOSE

Aviation Week

Volume 35

October 29, 1951

Number 18

Headline News	Equipment
Great Carls City.....23	New Ideas Spark System Conference 46
ABC Test on Boeing Field.....24	
U.S. Air Force New F-86 Safety.....24	
Air Power's Second Production Report.....25	
AF Green Seal to "Pilot".....26	
CAN Eagle Range of RCA, CME.....27	
Financial	Air Transport
Developments Flying to New Record.....28	Canons for U.S. DC-8 Condemn 45
	Continental Railway Lighting 45
	Forward-Look Signal Up in Prices 46
	First Two Idaho Dues 46
	Newark's Fly-Below-Safe Miles 47
Production Engineering	Editorials
Boeing Production Great Work.....29	They Didn't Want for Industry 78
New South Air Force Training 31	Being Kept in the Dark 79
Details of Surface Research 32	It's Important to Heavy 79
Departments	
News Digest 1	Washington Roundup 12
Aircraft Calendar 2	Engineering Industry 43
Person Page 3	New Aviation Products 50
World's Watch 4	Also on the Market 51
Industry Observer 11	25th Anniversary 52
Off the Record 12	Photo 53
27,739 copies of this were printed	

Robert H. Wood
Editor

Executive Editor
William Kruger
Alexander H. Winkler
Irving Stone
Earl Lee
G. L. Christian III
Donald A. Anderson
F. Lee Moore

Assistant Editor
John W. Hill
John W. Hill
John W. Hill

Managing Editor
Robert H. Wood
Robert H. Wood
Robert H. Wood

Editorial Board
John W. Hill
John W. Hill
John W. Hill

Editorial Staff
John W. Hill
John W. Hill
John W. Hill

Editorial Office
100 West 42nd St., New York 36, N. Y.
Phone: MU 2-1000
(Cable) 1-4005, National Press Bldg., Washington 4, D. C.
Phone: NA 2-1414

Domestic News Editor
John W. Hill
John W. Hill
John W. Hill

Foreign News Editor
John W. Hill
John W. Hill
John W. Hill

Editorial Board
John W. Hill
John W. Hill
John W. Hill

Editorial Staff
John W. Hill
John W. Hill
John W. Hill

Editorial Office
100 West 42nd St., New York 36, N. Y.
Phone: MU 2-1000
(Cable) 1-4005, National Press Bldg., Washington 4, D. C.
Phone: NA 2-1414

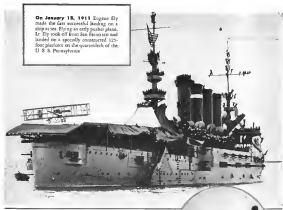
AVIATION WEEK
October 29, 1951

Editorial Office
100 West 42nd St., New York 36, N. Y.
Phone: MU 2-1000
(Cable) 1-4005, National Press Bldg., Washington 4, D. C.
Phone: NA 2-1414

Editorial Staff
John W. Hill
John W. Hill
John W. Hill

Editorial Office
100 West 42nd St., New York 36, N. Y.
Phone: MU 2-1000
(Cable) 1-4005, National Press Bldg., Washington 4, D. C.
Phone: NA 2-1414

FIRST LANDING ABOARD SHIP—1911



On January 18, 1911 Eugene Ely made the first successful landing on a ship's deck. Flying on a Curtiss pusher plane, he took off from his launch and landed on a specially constructed 120-foot platform on the quarterdeck of the U. S. S. Pennsylvania.



Eugene Ely's pioneer landing aboard the U. S. S. Pennsylvania was the beginning of shipboard aviation. Although years were to pass before the U. S. Navy commissioned its first aircraft carrier, the Langley (converted from a collier), Ely's flight marked the dawn of a new era in naval strategy and tactics.

Phillips Petroleum Company, pioneer in the field of special aviation products and lubricants, has long been one of the country's largest suppliers of aviation fuels for military and commercial use. And now Phillips is ready with new fuels for turbo-prop and jet, in addition to its tremendous capacity for producing 115/145 grade aviation gasoline.

For dependable, high-performance aviation products, call on Phillips. The Aviation Department, Phillips Petroleum Company, Bartlesville, Oklahoma.

Today's service range for jet and turbo-prop engines is for a landing about one of our cities off the coast of Rhode Island.



AVIATION PRODUCTS



INSTRUMENTS ARE SUBJECTED TO LITTLE-VIBRANT RATE TO DETERMINE THE EFFECT OF DIRECTION ON READABILITY OF DIALS

Flight Tested Without Leaving the Ground

G-E Aircraft Instruments Subjected To Rigid Climatic Tests at Factory

A tertiary chamber with an engineer in charge in the new General Electric climatic test laboratory, Test-cause de pendability, all G-E aircraft instruments are subjected to a series of tests which simulate all even caused the conditions encountered in actual operation.

Climate and physical tests vary from accelerated vibration tests with frame vibrations up to and exceeding 3000 cycles per second, to ultraviolet ray tests demonstrating the effect of intense sunlight on the instruments.

Extreme vibration tests are made to determine shockloads and accuracy changes. Instruments are retested at conditions up to a maximum point of 2500 cycles per second and 200's linear acceleration.

HUMIDITY ROOMS are used for exacting checks of accuracy and deterioration.

300 SHOCK TESTS are made with the instruments placed in 3 different positions.

SALT SPRAY TESTS are performed at 65°F with reverberant moisture in 50% salt water solution.



NEWS DIGEST

DOMESTIC

Eight Douglas DC-6's have been ordered by three military buying units for this type to 137. New orders were placed by Continental Air Lines (2), Western and Comstock (McCombs de America, these each).

James F. Strick, 44, Associated Press aviation editor since 1951, died Oct. 19 in Silver Spring, Md., after a prolonged illness.

Douglas C-47 modified for Antarctic reconnaissance has been delivered by Transcon Air Lines to the Argentine Air Force. Plane is fitted with this. Role equipment and long-range tanks give plane duration of 24 hours.

Helicopter Council of Aircraft Industries Assn. will discuss the helicopter's commercial future at Nov. 2 meeting, Washington, D. C. Frank N. Passeri is council chairman and Don R. Mochler is secretary.

U. S. altitude record for light airplanes, set by Harold E. Musick Sept. 1 in an Aerostar Sedan, has been approved by National Aeronautics Assn.

Edwin F. Schuch, 35, McDonnell Aircraft Corp. engineering test pilot, was killed Sept. 13 in the crash of an F2H Banshee near Lambert-St. Louis Airport. The first mission included the F1H, XP21H, XP25, XP26, F2H-2, F2H-2P and F2H-3.

Passenger and executive plane exports, of aircraft of 6,000 lb and under, empty aircraft weight, by air companies totaled 36 during September, valued at \$105,865. Exports by the air companies for August totaled 19 worth \$122,916.

Rocket motor production by Ryan Aerochemical is being increased tenfold as a result of new orders received. Latest contract for rocket motors is from Fairchild Fire & Radar Co., Los Angeles. Previously Ryan had held rocket powerplants for Douglas.

Thomas H. Book, 70, former chairman of the board of General Electric, died Oct. 16 in New York City. In 1941 he received the Frank M. Hawks Memorial Award for his aviation services.

Dr. Allen V. Aron has been appointed acting director of the National

Bureau of Standards, according to Edward Campbell, Dir. Aron worked in the bureau's time for science and health during World War II and more recently has worked with government agencies dealing with electronics, medicine, radar and basic instrumentations.

FINANCIAL

Capital Airlines earned \$1,215,171 net profit in the first eight months of 1951. Operating profit in August, 1951, was \$476,624, with net profit (after taxes) of \$235,512. Operating revenue that month was \$1,645,080.

Delta Air Lines has declared a 25-cent quarterly dividend, the fourth this year. President C. E. Woodman stated that the carrier would show an estimated net profit of \$4,135,000 before taxes for the quarter and net (after taxes) of \$165,000. Total revenues were \$4,945,000.

Douglas Aircraft Co. sales totaled over \$150 million for the corporation's period ended Aug. 31, and backlog was over \$1,315 million. Net income for the period was \$5,245,173, compared with \$4,549,230 for the same 1950 period. Profit was 59.5% net income, 10.5% gross.

Northwest Airlines reports net earnings of \$1,644,425 after provision for income taxes of \$1,665,000 for the nine months ending Sept. 30. Total revenues for the period rose to \$36.7 million, operating expenses were \$31,714,299. A slight decrease in domestic passenger revenues, resulting from reduced schedules, was more than offset by a 35.8% increase in international passenger revenues.

INTERNATIONAL

Jetliner production has halted because of Aero Canada's extensive military commitments for the Canadair jet fighter and Overseas transport engine. The company is closing its New York office, headed by R. Deane Spivey, who is resigning. Some developmental and training work on the jetliner is continuing. The first of 124 CF-80 Canadair fighters now tentatively delivered to the RCAF Oct. 17.

Queen Catharine transport of Queen Charlotte Airlines, crashed into Mt. Benness, near Nanaimo, British Columbia, on Oct. 15 killing 21. The plane was enroute from Kamloops, B. C. to Vancouver.

for faster construction of faster planes

Chicago Pneumatic, pioneer in the development of airplane tools, offers the world's largest line of pneumatic nut drivers and Air Force Tools, developed and marketed by Air Tools Company Inc. (A.T.C.), Research Editor. A copy will be mailed on request.



CHICAGO PNEUMATIC TOOL COMPANY
2500 West 12th Street, New York 19, N. Y.

CHICAGO PNEUMATIC TOOL COMPANY
2500 West 12th Street, New York 19, N. Y.

standard of the aircraft industry



FAST, SAFE AND SURE! 3H safety clamps are easy to apply.

For faster, better, more efficient fabrication of sheet metal riveted and welded sections, as well as other applications, 3H Safety Clamps and applying tools are the overwhelming favorite with aircraft plants. They are easy to apply and remove, hold securely under all conditions, withstand hard usage and offer a guarantee of safety.

Since the start of World War II, tens of millions of 3H Safety Clamps have been used in aircraft production. They have been constantly improved and new types developed for specific purposes. The present 3H line is comprised of several basic types (shown below) with sizes to fit various size drill holes and thicknesses of material. Or, Monogram engineers will develop special clamps for your unusual requirements. Write today for catalog.



AVIATION CALENDAR

Oct. 29-30—Av. Industry & Transport Assn. of Canada, annual general meeting, Seymour Club, Montebello, Quebec.

Oct. 29-31—National transportation meeting of Society of Automotive Engineers, Ill., at Knickerbocker, Chicago.

Oct. 1933—First world conference of flight engineers, sponsored by Flight Engineers International Assn., Lexington Hotel, New York.

Oct. 30-Nov. 16—Fifth Air Transportation Institute conducted by The American University, Washington, D. C.

Oct. 31—Nov. 1—Symposium of Aerospace Engineers, lunch and luncheon meeting, Drake Hotel, Chicago.

Nov. 6-8—Symposium on the Physics and Medicine of the Upper Atmosphere, sponsored by AF School of Aviation Medicine and the Lovelock Foundation for Medical Education and Research, Plaza Hotel, San Antonio, Texas.

Nov. 7—Annual Wings Club Dinner, Waldorf Astoria, New York.

Nov. 8-9—Seventh annual national conference on industrial hydraulics, sponsored by the graduate school of Illinois School of Technology and American Research Foundation, Sherman Hotel, Chicago.

Nov. 15-16—Seventh annual meeting of The Magnesian Assn., Belmont Hotel, New York.

Nov. 16—Annual business meeting of the American Rocket Society, 28 W. 58 St., N. Y. 10, N. Y.

Nov. 27-30—Aviation Distributors and Manufacturers Assn. meeting, Waldorf Astoria Hotel, New York.

Nov. 28-30—National convention of the American Rocket Society, Atlantic City, N. J.

Nov. 30-Dec. 4—Meeting of the American Society of Mechanical Engineers, Chalfonte-Haddon Hall, Atlantic City, N. J.

Dec. 6-7—Aviation Assn. of America, 10 W. 58 St., N. Y. 10, N. Y.

Dec. 4-5—Transportation research luncheon in honor and prize conference, sponsored by Vickers Incorporated, Hotel Manhattan, Detroit.

Dec. 6-7—Aviation, Controls System, Chalfonte-Haddon Hall, Atlantic City, N. J.

Jan. 5-6, 1934—Annual Miami Air Show, sponsored by the Florida Air Photo Assn., Opa Locka Airport, Florida.

March 16-17—Symposium of Radio Engineers, Waldorf Astoria Hotel & Grand Central Palace, New York.

March 17-18—Second Midwestern Conference on Fluid Mechanics, to be held at Ohio State University.

March 27-28—American Society of Tool Engineers, International Amphitheater, Chicago, Ill.

PICTURE CREDITS

1—Copyrighted illustration; 10-12—National Aeronautics; 13—The Daily News; 14—The Daily News; 15—The Daily News.



REVAMPED NIEUPORT—Being tested by Canadian Air & Forestry at Coburnville, Montreal, is new Nieuport 50B VII, which differs from earlier models by having longer, flattened fuselage and oil-cooled wings. Cabin doors close by lever-cord act.

Plane News on Land, Sea and Air



NEW DH 100P—Hollow steel-blade prop on Argus engine has 18 in. 4 in. dia., is designed for turboshaft.



NEW DH 100P—First flight view of the new DH 100 multi-engine, turbo-prop (left) engine (above) night lights highlights rail's swept surface, three grouping of propellers. Note very high rubber-enclosed placement.

NAVY'S NEW SUPERBARGE—Let's see a concept (below) of the Navy's upcoming \$210 million supercarrier designed to carry jet fighters and bombers shows off's very close look, with no obvious base visible on flight deck. The 1,600 ft ship has multiple elevators and four long catapults for launching planes rapidly. Supercarrier will be named USS Forrestal. It is heavily armed.



CMH parts for JET AIRCRAFT



CMH REX-FLEX Flexible Stainless Steel Hose and Stainless Steel REX-BELLOWS for aircraft meet the most advanced standards for jet aircraft. Whenever flexibility must be combined with high resistance to heat, cold or fatigue . . . wherever dependability and durability are necessary, CMH stainless steel hose and bellows answer connection problems. Whether it's a coil hose bellows assembly, a cross ignition tube, a condensate collection line or an anti-icing cable, CMH

offers a background of engineering and fabrication experience, that is unmatched in the industry.

For the most modern jets . . . or for conventional craft . . . it will pay you to draw on this extensive experience. For recommendations and an outline of your flexible connection problems . . . and ask for descriptive literature on CMH stainless steel hose and bellows for your files.

Phone: MacLean
CMH products (jet
hose and bellows)
for over 30 years.



CMH

CHICAGO METAL HOSE Corporation

1302 S. Third Ave., • Maywood, IL • Plants at Maywood, Bays, Rock Falls, and Bannock, IL
In Canada: Canadian Metal Hose Co., Ltd., Brampton, Ont.

ONE DEPENDABLE SOURCE
for every flexible metal hose requirement.

Insulated and Uninsulated Flexible Metal Hose in a Variety of Sizes • Expansion Joints for Piping Systems • Jetting Hose and Hose Adapters • Flexible Metal Hose and Hose • Assembly of Hose Components

WHO'S WHERE

In the Front Office

James G. Ryan and Eugene M. Luker have been elected vice presidents of Corbin Wright Corp., Irvine, passed C.W. last year as director of industrial relations, coming from Boeing Aviation Corp. where he had held a similar post. Luker also joined the company during 1952, previously was vice president public relations for the N. Y. Stock Exchange.

Henry F. Argente has been named as assistant vice president at Raytheon Mfg. Co., Waltham, Mass., and also is designated assistant manager of the Ford Tube division. Argente joined the firm in 1952, has been sales manager of the division since 1949.

J. B. Wadley has been promoted to assistant to the vice president production of the Pacific Aviation Corp. He formerly was manager of the engine division. But last, a post now filled by E. B. Erbitt.

Fred H. Lawson, Jr. has been designated vice assistant to the vice president general manager of Lark Aviation, Inc. A former Air Force bomber pilot, Lawson was with Lark's Washington Air Base Co. since 1946.

Changes

Quentin G. Terman has been named manager of industrial engineering for General Electric's engine division. In other General staff changes, W. A. Clegg has been made chief of engineering flight tests at Fort Worth. Other changes here, D. C. McDonald and J. J. Mott were transferred to the new modern plant in power plant administration. A. F. Thompson was made chief of production control, succeeding A. E. Bennett, who became assistant chief test engineer. G. A. Dwork has been named chief of administration. At Kansas City, D. C. Lawson has been designated manager of the R & D program at Raytheon. F. M. Propp has been named manager of flight tests. G. A. Livingston has been appointed manager of quality control.

W. A. Bostar has been made control systems engineering manager for General Electric and J. D. Smith has been named assistant chief project engineer systems.

John N. Smith has joined Perkin-Elmer Corp. as administrative manager.

Richard J. Donnelly has been named assistant to the director of personnel administration. Kelly O. Johnson has been made assistant planning administrator and Arthur Weber is new assistant superintendent of production control.

Travel Log

J. W. Miller, sales manager of Paper Air Corp., and Frank Meridian Jones, export sales manager, have left New York for a six weeks European tour. Jones will demonstrate the Paper Super Cells and attend a United Nations meeting in Rome which will discuss some of controlling the Middle East fuel problem.

INDUSTRY OBSERVER

► Better means of debagging between the Allison J33-A33 and the General Electric J33-GH-23 jet engines, which are both radically changed from the earlier less J35 engines with smaller disk numbers, is going to simplify this aircraft industry problem. The Allison disk 23 will be redesigned J-33 and the GH disk 23 will now become J-33.

► E. F. Gombach and Boeing have jointly developed a "sweep boost" for the Boeing firing boost reflecting system, a 15 lb. rubber cushioning device to damp out the sudden load-shock into effect requirement in the fuel line when the high speed fuel flow is suddenly cut off. The production version is described as the product of long testing and development, from difficulties in meeting stringent Air Force service requirements.

► Some Navy pilots who have flown jets on technical missions agree with the Air Force contention that they are more stable flying platforms than piston engine fighters. The smooth flight of jets at high operating speeds is overshadowed by vibrations experienced when they leave take and dive holes to show down for ground support missions, they say.

► General's new engine for turbo-propeller-powered T-39 trainers will be Jet Turbine Turbine of the future. They will be powered by Allison T-39, and will use the new engine General 340 turbine since General is still now making 240 turbines as well as the engine T-29 turbopropeller and bomber engines. Precision T-39 models include, besides the original T-29, a powered T-29A and an unpowered T-29B. This indicates that the turbo-propeller plane will probably be the T-39, which the turbine modification is considered radically great to convert a completely new series designation in which case it may be the T-37.

► Conversion of elements of some de Havilland Vampire jet fighters purchased by the Royal New Zealand Air Force, has shown up something of the planes on arrival and some have had to be scrapped because corrosion was so far advanced.

► Dodge designs of Chrysler Corp. recently has been picked to manufacture Blawie Standard steel four-blade propellers for the Boeing C-97 Stratofreighter transports. This order includes that propellers Ford and Whaley R-4500 engines will continue standard on the C-97s and that the four-blade Stratofreighter version is not expected to go into quantity production very soon.

► One aspect of dual-purpose plant construction, such as is being sponsored by General Motors Corp. for aircraft production after military with automobile civil production, is the lesser proportion of overhead construction that may be required for such plants. It probably would be rated less if much of the plant space is used in production production, thereby cutting down total overhead construction for the whole which is resulting a size viewed with alarm in government circles.

► NACA offers an expensive demonstration of how it makes when some amplification of jet engine response modes by the simple method of introducing a polyethylene film between the blade root and the socket in which it fits.

► Boeing's 200 hp. gas turbine already has made flights testing several hours in the air in a test installation in the Cassin-L-19 Air Force base plane, normally powered with a Continental piston engine rated at 215 hp. for takeoff. It was in due to make its first flight soon as a helicopter propeller, probably in the Kansas helicopter, under an experimental contract recently awarded.

► Air Force announcement that the British-designed Supersonic J45-W-1 engine will power the Martin-built Canberra J-57 twin jet bomber from the first step in Air Force Week Feb. 1977 that this powerplant was dated for Martin's Canberra. The definite scheduling of the Carbin Wright-built Supercraft for the British-designed engine bomber may be another factor in the switch from Republic F-84 jet fighters to another jet series, (Jetstream) Westwind 475, p. 11). The acquisition of the F-84F, which would make some Supercraft, which these planes would have used, will be available now for the Canberra.

Washington Roundup

Secretary Sawyer: Last Words?

Secretary of Commerce Charles Sawyer is talking like a man about to leave the Administration—giving it a going over both while his back is off command, an indication.

The Secretary brought a long battle with Defense Mobilization Director Charles Wilson over control of the mobilization program. Sawyer would have restricted Wilson to general policy matters, instead directing the program as Commander. He's never resigned himself to the defeat, continued to use Commerce control.

In Cleveland last week, Sawyer attacked loss federal spending, demanded cuts in non-essential, then went on to indicate the "status for six congresses, committees and study groups," at which time Sawyer.

Washington went President Truman's response to the attack by his Cabinet office.

Should Sawyer leave, Undersecretary of Commerce for Transportation Felix Ratzel is in prospect to succeed.

Mr. Republican's Defense Plank

Defense planks maintained by the Republican Presidential candidate, Sen. Robert Taft, is notable because it doesn't challenge the Administration defense program—only perpetuates it with a question mark.

Taft has shelved his belief for a "go it alone" defense against Russia, which would mean almost complete air power backstopped by an adequate land force and maximum ground force.

Only eight months have opened the strategy, but unsuccessful, Senate opposition to the Administration's plan to dispatch divisions to the aid of agreement it would mean a "land war" to hold the Continent.

There are two main factors behind Taft's sounding military "conservatism" of Russia at the time:

- Political: Taft supporters shy from the "isolationism" tag that "going it alone" would mean. And they don't want to furnish an issue that might paralyze Gen. Douglas Eisenhower, heading up European defense, to challenge Taft for the Republican nomination.

- Technical: Tactical atomic firepower now opens the prospect of a separate Allied tactical air force being able to hold Europe with maximum air support, and ground forces. Tactical A-weapon were little more than hoped for early this year when Taft proposed the "go it alone" program.

On the positive side, Taft maintains a traditional avian view as to relying on the defense effort the economy can support, and, within this, shape the military program.

He told the news conference at which he announced his candidacy:

"It is the overall expense that worries me in the present situation. I have felt that there should be a complete reexamination of the whole program of self-defense military action, because I think that it is reaching a state by 1955 and 1956 which will really be a serious threat to the economic stability of the U.S."

"I would like to see the whole thing reexamined by a commission of military and civilian personnel to decide what kind of a war we might have in a World War III, what our objectives will be, what our economic limitations are, and therefore, what this program should be in the military field."

Taft's Military Advisors

These are Taft's three military advisors—the men a Taft administration would select to carry out its military policy.

- Gen. Douglas MacArthur, presently confined at the original station of the now abandoned Hoover-Taft program for almost strategic air power.

- Rep. Carl Albert, of Utah, a former MacArthur staff officer, who, as military adviser to Republican National Committee, (which he still serves), pushed the air power program.

- David S. Ingalls, Taft's cousin, Assistant Secretary of Navy for Aeronautics in the Hoover Administration. He holds a commodore's rank in the Naval Reserve, has been on Pan American World Airways board of directors since 1945.

Contract Canceling?

A letter in Congress' response to a separate over-see from Taft's proposed plan, it doesn't add to present military. Most of the money allocated Air Force and Navy now for plane buying actually won't be "spent" until 1953 and 1954, when the aircraft are delivered.

A big air power program can be laid on paper, with little pain to the economy now.

And of the past years, too many as '53 and '54, at the international situation brightens, contracts can be canceled, congressional reason.

Sen. Joseph C. McCarthy, chairman of the Senate Appropriations Subcommittee on the Armed Services, said Air Force officials at a hearing, "Contracts can be written upon a reasonably contingent basis, so that at the very end of, when you get into the 1955 and 1956 fiscal year, and the situation has changed, you would know what to do—these contracts would be cancellable."

What to Expect

- Gas like from 1.5 cents a gallon to 2 cents Nov. 1. The lowest will add millions of dollars to auto operating costs. But not to money as the lowest to 1948, and up by the Administration.

- An ending of differences in Army, Marine, and USAF concepts of tactical support before House Armed Services Committee.

Second annual Republican members, Rep. Sterling Cole, says he will insist on it when the new session convenes in January. The new law establishing a Tactical Air Command as a "staff" arm of USAF, Cole comments, "don't solve the issue, at all. We want to find out how much emphasis the Air Force is going to put on tactical aviation in its buildup. It has always been treated like a step-child by the Air Force."

- National transportation program by the end of the year, being down under the direction of Undersecretary of Commerce for Transportation Felix Ratzel, in objective to streamline the transportation route structure and provide for low and equitable taxation, of all types of cars with regard to government support.

Rebel is emphatic that his office will only "consequence" attacks to obstruct the program, and will not intrude on the independence of CAB and other transportation agencies. But some members disagree.

—Katharine Johnson

Plane-by-Plane Costs for Air Coach

(Per 14% Profit Per Flight)*

If a—	DC-4	DC-6	DC-6B	749A	Comme
Costs this much to operate at capacity (Cost per seat mile)	4.51	4.65	4.47	5.02	
And carries this many passengers	51	65	80	60	
Then the cost per passenger* * New York to Shannon would be:					
Fuel load	\$147	\$158	\$146	\$364	
92% load	184	197	182	395	
75% load	195	210	194	318	
70% load	210	225	208	254	
65% load	225	245	225	282	

* Figures represent cross section of obtainable trans-Atlantic airline cost estimates, including 14.5% operating profit margin.

** One-way cost, assuming half the passengers purchased 30% discount return tickets.

Note: These estimates may be predicated by fact some carriers' costs, some appear starting each service area. House other trans-Atlantic carriers may challenge legitimacy of some or all of these cross-section estimates.

Ocean Coach Costs Shown

- Maximum \$250 one-way fare New York-London expected to be proposed by U. S. carriers.
- But PanAm ready to start service next April at \$225 figure (\$405 roundtrip), and predicts 75% loads.

By F. Lee Moore

U. S. and foreign airlines spacing the Atlantic will make an historic decision in the coming months, a new move out a biggest chunk of trans-Atlantic travel business for air carriers than they have ever known.

In the next two weeks, all the scheduled trans-Atlantic airlines will propose their best cases for and against starting scheduled air coach service across the Atlantic next spring. They will make their final decision on this issue at Nice, France, on Nov. 20.

Pan American World Airways has opened the door to start trans-Atlantic air coach service April 1 at a fare between \$225 and \$250 one way (\$405 roundtrip).

May Compromise—Threatened by previous delays, PanAm's President Juan

Trapp has even offered to break the International Air Transport Association, rate agreement structure and set it alone at \$225 next April 1 if the other trans-Atlantic carriers don't agree to it itself. Two other airlines for the New York-London service last week with Civil Aeronautics Board, PanAm and TWA.

Some airlines with permission to bargain with a \$237.50 one-way fare proposal as a \$235 \$246 compromise.

Outlook is for an IATA settlement next month on a minimum \$250 one-way air coach fare (New York-London \$490 roundtrip), according to news arising and CAB observers.

This issue with standard service now costing \$71 round trip New York-London. The air coach fare would lower costs for carrying off of Europe as well-fueled, one-way fare to Shannon, the European gateway, would be only \$221.

CAB has already given a record lowering trans-Atlantic air coach seat spring, at one-way fare between \$225 and \$250. CAB even authorized the air coach agreement of last spring on ground it was too vague, as time passes and it showed for many very interests.

Many Passengers—But CAB demanded details agreement on carrying capacity of the planes before it would authorize to any fare. How many passengers the airlines will actually carry in the planes, better in air coach service comments.

Later obtainable trans-Atlantic airline cost with profit figures designed to find a fair coach fare are shown in table (left). The remainder of the cost table cost with profit figures for the four planes considered comes to 4.71 cents. This compared with the figure agreed to by the airlines in the IATA cost compromise of 4.53 cents, a seat mile for a full airplane. Reverse per plane with full load would be 7.1 cents a seat mile on a \$250 one-way fare.

Mass problem then comes down to how much will airlines be fit to figure for a coach service at such a fare.

Enhancing the Cost-Airline of IATA finally agreed that 4.65 cents a seat mile was a fair compromise cost-profit figure for full load New York to Shannon. Here is how they work that have cost figure.

If 3,340 miles from New York to Shannon At 4.65 cents a seat mile full load, the cost-profit figure per passenger for the full dry to Shannon one-way in 3,340 miles takes 4.65 cents per seat mile, or \$143.90 total. If you figure half of the people going due now have bought a roundtrip ticket the one-way cost is \$71.95.

Now lower the estimate load factor to 70% and you get \$236.15 complete cost-profit figure for each passenger, New York-Shannon. For the Shannon-London fare, complete figure \$23 per passenger.

That makes total New York-London complete cost with full profit per passenger for the trans-Atlantic service \$243.15. So the airlines have agreed that if they can count on a 70% load factor on trans-Atlantic air coach, a \$250 one-way fare (\$490 roundtrip) covers their complete cost plus 14% profit estimate.

But figure on a 75% load factor, as Pan American claims you can, the complete cost plus full profit per passenger New York-Shannon is \$216.66 or \$216.66 New York-London.

Setting the Fair Fare—But the carriers' cost count on a 75% load



F-58 VOODOO is to be ordered into production for the Air Force as a long-range escort fighter. The side view, and...



FRONT VIEW: This photo on opposite page gives a photographic three-view of McDonnell's concept 700-mph plane.

AF Gives Nod to McDonnell 'Voodoo'

• Programmed for production 2 years ago, twin-jet was slanted aside in favor of Lockheed F-94D.

• Even now SAC support fighter has no home; initial work to be done at St. Louis, but future is indefinite.

After more than a year on the shelf, McDonnell Aircraft Corp. has been set NF-58 "Voodoo" fighter is to be ordered into major production by the Air Force. The plane, one of the nation's longest-ranged jet fighters, will serve to assist Lt. Gen. Curtis LeMay's Strategic Air Command bombers.

It is expected that McDonnell Aircraft contract will replace a previous contract to the Lockheed Aircraft Corp. for F-94D escort fighters. Proposed procurement of the F-94D has been stalled because of probability difficulties.

It is unlikely that McDonnell Aircraft will build the plane at St. Louis, because all available major Air Force production facilities there are now con-

verted to Navy F-4H and F-3H production.

The only major Air Force facility yet assigned is the Grady-Giles L. Martin-Norfolk plant which during World War II built Boeing B-29s. Most of this facility, however, is occupied by the Strategic Air Command head quarters and there are no present plans to convert that headquarters, it is heard.

• Up to McDonnell—This indicates that another plant at another location will be built for F-58 production unless manufacture of the plane is desired at another company.

Some speculation on this point was immediately knocked down by industry observers who stated that production under the initial contract would

have to be undertaken by McDonnell. If requirements are then further increased, it was pointed out, then a second supplier—probably an automobile manufacturer—may be called into the picture.

The Voodoo is powered by two Westinghouse J-34WE-22 engines each of which is rated at 3,600 lb. thrust with afterburners. Initial ducts are located at the wing roots and the engines exhaust out aft of the wings and below the tail. Wings and tail surfaces are swept back 35 degrees. Its top speed is reported as over 700 mph.

Plot comparisons are presented and bullet proof. Assurances are made as to ease of maintenance and under-wing fittings for rockets and bombs. Fuel capacity is 1,400 gal. without wing tip tanks, giving the craft a normal range cited at 3,225 mi. Production contract undoubtedly will call for wing tip tanks and provision for aerial refueling. Production version will be designated F-58A.

• 198-990 Planes—The F-58 has had



PLAN VIEW: The Voodoo is shown in this "on top" photo.

• 159-300 Planes—The F-58 has had a strong procurement case. Programmed for production two years ago, it was then struck from Air Force procurement during the defense recovery effort of 1949. In June of 1952 the F-58 was evaluated by the Air Force in conjunction with the Lockheed F-56 and the North American F-83 (F-86C) at Edwards AFB, Calif., to determine which was best suited to meet USAF escort engine needs.

Personnel planning had indicated that the winner would be recipient of a 150-300 plane order (Western World, June 25, 1953, p. 11). Although the F-58 assigned independent winner of the competition, Air Force officials had decided to press for heavier emphasis on fighter-bombers and as a result, the fighter-escort program was shelved.

Chances are that F-58 procurement will be considerably increased over the last contract because of Army interest in the long-range capabilities of the fighter. Army has long favored the F-58 (Aviation Week, Aug. 28, 1953, p. 11) because of its versatility as a tactical support fighter.

• General Support—Army interest in

the F-58 seemed even hotter a year ago when some consideration was given by the Air Force to use McDonnell for a tankage version of the plane. From Army point of view this would supply extra legs of the F-58 even further and make it still more desirable for tactical support of ground troops. Army viewpoint is that the only trouble with most jet fighters is that their endurance and range are far too low.

Personnel planning indicates the experimental tankage version of the F-58 only is a flying test bed for the engine and apparently gave little serious consideration to its development in major production. Later orders of the flying test bed to another company's program resulted in cancellation of the F-58 prototype project.

Old plans inherent to the Strategic Air Command in the F-58 long range combat with its maximum speed in excess of 700 mph. Military requirements demand that fighters provide sufficient speed margin over the high subsonic speeds of long-range bombers now in operation. The speed advantage of current jet fighter equipment over jet bombers such as the B-37, B-47

and the coming B-57 and B-66 heavy bombers is considered to be inadequate. • Twin Jet—The twin engine jet fighters are viable in the long-range requirement needed in strategic escort operations. While selecting in the air involves the requirement to a degree, it is a matter of safety for the recipient from a long-range point of view if more than one engine becomes inoperative, it was pointed out.

Twin engine capability of the F-58 and the fact that the plane is able to cruise on one engine are strong factors in favor of the plane's selection.

Performance of the NF-58 includes a maximum speed of over 700 mph and a rate of climb of 6,000 ft per min. The plane has a gross weight quoted officially as "over" 23,000 lb. and an empty weight of 12,000 lb. span is 39 ft. 5 in., length 54 ft. 1.4 in., and height is 17 ft. 5.2 in. Complete design studies of the McDonnell F-58 was published in Aviation Week, Sept. 4, 1953, p. 17.

CAB Urges Merger Of MCA, Continental

Merger of Mid Continent Airlines and Continental Air Lines was proposed last week by the Civil Aeronautics Board. CAB said that separate the two route structures are weak and require heavy subsidy. But together, they would require about \$1 million less subsidy a year than now.

CAB issued an order that the two airlines "show cause why the Board should not find that the combination of the routes... into a single unified system... would be consistent with the public interest."

CAB cannot force airlines to merge. So it is up to them to show the management and stockholders of the carriers that it would be good economics for them to merge. CAB did the same thing a month ago for the East Coast route structure, proposing an investigation of merger possibilities of North-east/Continental with either National or with Delta plus some part of Capital's routes.

Shifted by USAF

Col. Ross D. Mottage, USAF, has been transferred to Wright-Patterson AFB, Dayton to head a new combined support division. Aircraft Production Resources Agency, and Industrial Resources division of Air Materiel Command.

Col. George Schenkel, who has been Air Force member of AFRA has been assigned to the staff of Maj. Gen. M. B. Bowler, Jr., AFRA, Director of Procurement and Industrial Planning

FINANCIAL

Trunkline Cash Dividends Calendar Years 1947-1951

	1951*	1950	1949	1948	1947
American	\$4,677	\$2,015	\$1,400	\$2,800	\$1,400
Capital	180	210	—	—	—
Chgo & Southern	199	215	170	—	—
Colonial	—	—	—	—	—
Continental	77	77	—	—	—
Delta	500	250	121	—	—
Eastern	1,498	199	—	—	199
Mid-Central	181	208	190	97	—
National	180	—	—	—	—
Northeast	44	79	40	—	—
Northwest	943	313	214	112	218
TWA	—	—	—	—	—
United	5,156	1,871	215	187	128
Western	283	—	—	—	—
Total	\$12,332	\$6,615	\$2,179	\$3,116	\$2,907

* Estimated

Dividends Flying to New Record

Domestic carriers are expected to pay over \$12 million to stockholders this year, twice what they paid in '51.

The airline industry will establish a new record in cash disbursements to stockholders this year. The domestic airlines are expected to pay more than \$12.3 million to their shareholders, almost double the \$5.8 million disbursed during 1950.

The record year has not only seen larger airline dividends, but the greatest number of airlines making disbursements.

For 1951, 12 airlines paid dividends compared to ten for 1950, eight for 1949 and only four for 1948.

► New Fines—Among the airlines that were new to the dividend lists this year were National and Western, each paying two separate dividends of 25 cents per share to their stockholders. For National this represents the first cash disbursement in its history. Western's 1951 payments are the first since 1936 when 25 cents per share was paid.

Likely to show blacked five years are the disbursements of Capital, Colonial and TWA. Capital is expected to fulfill the financial requirements of the contract surrounding its regular dividend and income disbursements in 1952. These will be the first since 1945 when 75 cents per share, or a total of \$120,000, was paid.

The biggest fissures of Colonial pay-

ments are cash disbursements in the immediate future. Colonial now has the unique position of being the only so-called trunkline failing to pay a cash dividend throughout its entire corporate history. TWA, bound by technical restrictions and the need for substantial cash requirements, is unlikely to make any cash payments soon. The only payment by TWA was in 1946 when 25 cents a share was paid.

► Five-Year Record—This outstanding table reveals the record of all cash dividend payments made by the domestic trunklines for the past five years, including 1951. Results for this year are partly estimated. Dividends in preferred stock are included with the payments on the common shares of the separate carriers.

American and United are expected to account for about 67% of the group's cash disbursements to stockholders this year. Both carriers have preferred shares outstanding.

► American's 400,000 shares of \$1% preferred stock account for an annual disbursement of \$1.8 million.

The second disbursement by American of a 25-cent dividend raises to 50 cents per common share its 1951 payments. This raises to \$5,267,000 the carrier's 1951 payments on its common

shares. United's 95,000 shares of 41% of preferred payments in annual dividend of about \$418,500. Only 75 cents per share has been paid on the common then for five years. The plan agreement, however, is known to favor a liberal dividend policy, and current earnings can readily support another 75-cent disbursement this year despite heavy capital requirements for 1952.

► Northwest's dividend payments during 1951 are represented completely by those made on its preferred shares. After paying on those payments earlier this year, the company paid all arrears and has restored the shares to a current basis.

► Eastern has followed a deliberate policy of building up the equity position of its shareholders by "giving back" the bulk of current earnings. As a result dividends to shareholders are modest in relation to available earnings. For 1951, a 25-cent payment in addition to the 25 cents per share already paid, is anticipated.

► Demand on Eastern—With current traffic levels leading to sustained and higher earnings, the airline group would obviously be expected to increase its cash distribution to shareholders. This expectation, however, may be mitigated somewhat by the heavy capital requirements necessary to support the carrier's aircraft acquisition programs of the current year.

While bank credits, other financing and depreciation throw-offs will supply the bulk of the funds needed for expansion, substantial demands will be made on retained earnings. This requirement will have to be balanced with management's desire to afford stockholders with an immediate return on the investment.

Regular and limited dividends have been characteristics of the air transport industry in the past. The continued expansion of the air carrier necessitated almost continuous investment of earnings. Airline equities have not, in the past, found their reward equal through the immediate income they may afford. Their main attraction has been in the growth qualities and ultimate degree of financial strength achieved by the companies they represent.

This condition, while constructive, is a major factor in an investment consideration in the airline group, no longer has the same validity today.

The broadening interest in the industry has led to expectations for a return to stockholders. The airlines do not live in an investment vacuum of their own.

To compete for investment consideration among other industrial groups, the air carriers may be compelled to provide a similar measure of income return to stockholders.—Selig Altschul

Here at Harter is a progressive, busy plant ready to go to work for you now. Here are the modern production equipment, the experienced management and the skilled labor force you want in a subcontractor. Location on major railroads and truck lines speeds delivery. Harter offers, also, the design skill and tooling facilities needed to start actual production on your product first.

Harter's reputation as the top manufacturer of quality steel office chairs and its record as a dependable subcontractor are your assurance that your order will be delivered on time and to specifications.

Write Harter Corporation or phone (313) 281-7801 for complete information on Harter's metal forming and fabrication facilities. Harter Corporation, 810 Prime Avenue, Sturgis, Michigan.



HARTER

STEEL POSTURE CHAIRS
STURGIS, MICHIGAN



Conair-Liner 340
power packages built by

ROHR

World's largest producer
of ready-to-install
power packages
for airplanes



In Chula Vista, California—9 miles from San Diego

PRODUCTION ENGINEERING



BRITAIN'S new high-wing monoplane transport, the Airbusco, is in production at Christchurch plant and there are...



PLENTY of Airbuscos on the assembly line, but...



WORKERS for the job are too few, and so are machines.

British Productive Giant Begins to Stir

- Airplanes being built, but on small scale because labor, housing and tools are scarce.
- Techniques range from hand work to automatic machines in revival of once-flourishing industry.

By David A. Anderson

London—A trip through some of Britain's aircraft factories quickly dispels the view that she is a passive member of the NATO production team.

There is no question but what the current production effort is small when judged on U. S. standards, but there are reasons why that is so. Aside from the fact that Britain is a small country, she is still very much in the process of recovery from six years of war. Labor is short in the industry, housing is short in factory areas. Tools are needed for production of the new breed of airplanes. Wages are not as attractive as in U. S.

In spite of all this, airplanes are being built. In dozens of small factories all over the face of England, parts for Meteors, Vanguards, Shackletons, Atlatlons and Sea Hawks are being turned out.

And there are indications of a renaissance in aircraft production. The new Swift, the Vulcan and the Hawker P.1067 representing the latest types of aircraft exist—no doubt about it because production items instead of aircraft prototypes.

And the people in the factories and offices are eager to get on with the job. **► Further Background**—During the week following the Farnborough display, I

visited four typical British aircraft factories to get background data on methods, employment, factory size. On the itinerary were:

- Airspeed division of the de Havilland Aircraft Co. Ltd. at Christchurch
- Supermarine division of Vickers-Armstrongs Ltd. at South Marston, Gloucester
- The de Havilland Aircraft Co. Ltd. at Hatfield
- The Bristol Aeroplane Co. Ltd. at Filton

This seemed to be a fair cross-section of the industry, because it included manufacturers of military and civil aircraft and engines. The products of these four factories include helicopters, piston and gas-turbine engines, and aircraft powered by piston and gas-turbine engines, and aircraft powered by piston, jet and turbo-prop engines.

Some of the plants varied from the three craft buildings and 1,000 employees of the Airspeed division to the



SUPERMARINE Attacker, used jet fighter in production at Swinden plant for service on British assault carrier.



GENERAL view of wing assembly area at plant where Attackers are produced.

operating layout of Bristol and its 16,000 workers.

And manufacturing techniques are the greatest from hand work to completely automatic machine methods.

Most of these verbs were entirely too short. So these observations accurately are short. But from them, certain conclusions can be drawn.

Airspeed Division

The three main buildings of the Airspeed division stand at the edge of a green plain at Christchurch, a little resort town on the south coast of England. In these basic surroundings, about 1,800 employees of the division are turning out the first dozen or so of the 20 Ambrosian-Bristol Viscounts in order for British European Airways.

• The Ambrosian-Bristol property called Elizabethan, class name given the aircraft by BEA—is a high-wing, seven-place transport for medium-length stage districts. It is powered by two Bristol Centaurus 651 piston engines, each giving 2,600 bhp for takeoff. The aircraft capacity is 40 to 45, depending on interior arrangement. Maximum gross weight is 52,500 lb. Wingspan is

115 ft. At a cruising speed of 240 mph, the Elizabethan will carry 11,450 lb of payload a stage distance of 350 mi, or 4,800 lb for 1,000 mi.

Airspeed uses like a very small factory by American standards, and by further comparison with our own plants, it is a model of serenity.

From the flowerbeds of rose trees that add the best lawn to the quietest space between hangars and grass airpads, the entire plant reflects the excellent housekeeping so characteristic of British factories.

Out reason for the appearance of Airspeed's plant is its age—the buildings were finished in 1941. The plant was used as one of the shadow factories during the war. It produced Airspeed's three troop-carrying gliders and Oxford transport, as well as de Havilland's great Mosquito.

But these were all wooden aircraft—and Airspeed's current problem is aircraft! The Ambrosian-Bristol is the first all-metal craft to be produced by the division, and as such, it presented many new problems. I got the impression that this is not reason for the continued delays in the Ambrosian program.



NOVEL test jig for checking wings.

• Easy Does It—A walk through the production area translates some of the subtle surroundings into the plant. The pace is slower than in the United States, a semi-laidback pace in the pps will have only three persons working at it. These are other jobs containing components which have been finished in place ready for assembly—but absolutely nobody is working on them. A rusted gun from the noise is dominating in the relative quiet of the factory floor. You get the feeling that it's really hard to hear or see here, and most of the staff is somewhere else.

This is not to say that the workers at Airspeed lose on the job. It's just that there isn't many workers. It was possible to walk all through the plant, traveling into perfectly complete hangars, along along outside over wing-fairing attachment frames, and still not interfere with a single worker.

When the Ambrosian-Bristol assembly and interior fitting is completed, they are flown off the 1,300 yd long strip which neatly parallels the plant. The full load testing, however, flights are made from the airport at nearby Bland.

At the conclusion of the Elizabethan



REVOLVING jig is used for bridge work after main components are assembled.



FINAL assembly shop at Swinden, shown in the ground view, is similar to those in U.S.

contract, Airspeed will have built a total of 25 planes. The first two, powered by Bristol 650 engines, were prototypes, the third was a production prototype, and the remaining 20 are the production order for BEA.

• After the Ambrosian-Bristol production of the Elizabethan steps at Christchurch, Airspeed will be setting up to build the de Havilland Vampire trainer and Venom fighter. In the case of the trainer, it will be back to wood work for the division, because the new version of that one-out-of-a-kind Vampire from which it was developed—in wood versus metal construction.

In this work, as in the case of the Ambrosian, the Christchurch plant will be finished components. From Airspeed's sister plant at Portsmouth, Cornwall, the Portsmouth factory supplies wing and tail sections for the Ambrosian.

Supermarine Division

The central factory of Vickers-Armstrong's Supermarine division is at South Newton, near Swinden, Wiltshire, in southern England. Here, Supermarine

is producing the Attacker, used jet fighter now being sent to squadrons service on board HMS Eagle.

• The Attacker is a single-place, low-wing, metal monoplane designed for use as a fighter. It is powered by a Rolls-Royce Nene 3 turbojet rated at 5,800 lb. sea level static thrust. Span of the fuselage, swept wing is just short of 37 ft. Gross weight is 11,500 lb. normally, and 14,055 lb. with a 500-gal. jet fuel tank.

Building up the Swinden plant are other dispersed factories at Southampton, Tringbridge and Newbury.

The Swinden works dates back to 1911, when it was built as a shadow factory for production of the Miles Master trainer. Some of the top personnel at Swinden today came from the Miles representative of war.

One building is set up as a assembly area for the Ambrosian, and houses two lines of aircraft, facing each other in a cross road. A single of air lines and power cables cross the floor, these areas to be windows everywhere. The view of windows fills and most guests complain the fact that this is one of the better production plants in Britain. Some indication of the amount of

GET BOTH
ECONOMY AND
LONG LIFE
WITH

Metal-Cal

THE PERMANENT,
SELF-ADHESIVE
IDENTIFICATION
DEVICE

If you need to fasten and label—
a name or number in front of
a piece of machinery, a name
plate and so forth—Metal-Cal
is the answer for you!

Consisting of a 25% solution
of aluminum foil powder, Metal-Cal
is applied with a brush, spray
or roller. It is self-adhesive and
can be applied to any
smooth, clean surface. It
will adhere to metal, wood,
glass, etc.

Give us a METAL-CAL DEMO
kit. We will send you a
sample of Metal-Cal and a
brush. You can see for
yourself how easy it is to
use. Write to: METAL-CAL
Division, C & H Supply Co.,
P.O. Box 100, New York, N.Y.

See a METAL-CAL DEMO kit
before you buy. It is so
easy to use that you can
see for yourself how easy it
is to use. Write to: METAL-CAL
Division, C & H Supply Co.,
P.O. Box 100, New York, N.Y.

* TRADE MARK REGISTRATION

Metal-Cal
DIVISION

C & H SUPPLY CO.

Dept. 6-1, Boeing Field, Seattle & Washington
Sales Office: New York, N.Y. Sales Office: New York, N.Y.

labor required to produce Attacker was given *Airframe Week* at Sweden. These figures are based on a rate of 4 complete airplanes per month, which is probably somewhat below the current production figures.

- 2,000 workers for sheet metal and fastened parts and minor subassemblies.
- 1,500 workers for major subassemblies.
- 750 workers for wing assembly.
- 750 workers for fuselage assembly.
- 1,600 workers for final assembly.

This is a total of 6,300 productive workers, and presumably includes those in Supermarine's satellite plants which supply Sweden with components.

Off to one side of the assembly area is a wing test rig, a rather novel piece of equipment Supermarine has found fit to be a convenient preassembly device for checking out the many stresses involved in the wing's wings.

The complete wing assembly with leading gear installed is suspended at a test fixture and connected to a test bench with hydraulic and electrical power supplies. It is possible to check out vibration, loading, unlatching and extension of the leading gear and flaps, as well as to prove out the wing folding system. And of course, landing and engine lights can be checked visually.

That is all done before the wing as-

sembly is taken to final assembly for fitting to a fuselage. If any faults are found later in a postflight check of systems, they can be traced with a minimum of effort to the correct fuselage location.

■ **Small Production**—In spite of the crowded appearance of the factory and the haste of activity everywhere, Sweden's production is fairly swift. When the total number of airplanes eventually on order is completed, the plant will have produced some 190 complete airframes, including those ordered for export to the Royal Egyptian Navy.

Expansion is possible at Sweden. Even though the assembly bay is crowded, other sections of the factory were almost deserted. In one building, where detail parts and templates were being made, a large floor area was still empty. That, it developed, was being used for machine tools currently on order from the United States.

One deterrent to expansion would be the labor supply, tight all through the aircraft industry. In order to add more of their present staff, Supermarine has gone into the transportation business and runs bus lines on certain routes within a 15-mile radius.

To get more workers into the arm would mean that more housing would have to be built in the vicinity. And housing, which is never all over here, is more of a problem in the Swedish arm. That again was neither blazed during the war, nor is it now classified as a development area. As a result, it has no priority claim for new houses.

Even in the jet era, when aircraft are built in a faster manner, the Swedish people are not worried about a skilled labor shortage—it's not a labor shortage. During the late war, for example, they ran the factory with only 10% of the workers classified as skilled. Right now, the figure is 30%, which means that Supermarine has an excellent foundation of skilled labor on which to build the superstructure of unskilled help that would come with continued expansion.

And of course, there are fewer women workers now—the figure is 35% as compared to nearly 60% in 1945.

■ **Incentive Scheme**—Work process at Sweden have been thoroughly time studied and an incentive scheme based on these studies is in operation. Incentive pay is provided for work done over and above prescribed schedule. Such a procedure is still a rarity in England, but is gaining acceptance in the industry. This may be because the Swedish business is on an industry-wide bargaining basis which sets the wage pattern for the entire country. (Variations are permitted in recognizing the fact that it costs a worker more to live in a city than in a rural area, for example.)

Consequently, there is no possibility of attracting a labor supply by offering

IN THE CONVAIR-BUILT...

NAVY R3Y-1



Automatic
cabin temperature control

With its complex ducting, the cabin temperature control system for Convair's turboprop water-based

aircraft presented a real challenge. The R3Y-1, used for transport, has two separate cabin air distribution systems. The mixed air temperature in each of two separate ducts must remain within 10° of the other.

Barber-Colman Micropulse System regulates the position of the refrigerant bypass valves to control duct temperature according to cabin requirements. This application is one more example of how Barber-Colman airplane temperature controls can be custom tailored to specific aircraft requirements.

REPRESENTATIVES IN LOS ANGELES, BARTLE, CHICAGO, BIRMINGHAM, NEWARK, BOSTON, MA.



BARBER-COLMAN COMPANY
1000 ROCK STREET • ROCKFORD, ILLINOIS

VISIBILITY



by Swedlow

The BOEING B-47 stratojet is the fastest known bomber in the world. This great six jet engine powered, swept-wing bomber will be produced in quantity for the U.S. Air Force by Boeing Airplane Company, Wichita, Kansas, the Douglas Aircraft Co., Tulsa, Oklahoma and the Lockheed Aircraft Corp., Marietta, Georgia.

Transparent laminated canopies and all-cotton fuel cell backing (in accordance with Boeing specification BMS-6-13) are SWEDLOW's contributions to the admirable functional efficiency of this superb fighting machine.

SWEDLOW was selected as a major supplier of these important factors because of SWEDLOW's unique reputation and more than a decade of experience in the development and fabrication of vital parts for the aircraft industry.

Swedlow
PLASTICS CO.

• We shall be glad to assign our staff engineers to work with you in solving problems in all phases of plastic fabrication.

LOS ANGELES, CALIFORNIA • YOUNGSTOWN, OHIO

PAC FOR SURVIVAL!



RESEARCH MOVES AHEAD with the PAC Cabin Pressure Regulator

* **TOUGHNESS, DURABILITY, OR PERFORMANCE, ANYONE?** See
OUR NEW TO-WEAR SPECIFICATION 41102-A.
30 In./Min. Flow at 12,000 feet at 2" WG Differential.

- Synthetic
- Low Pressure Differential
- High Pressure Differential
- Rate of Pressure Increase
- Rate of Pressure Decrease
- 2000 ft. Altitude
- Maximum Difference in Altitudes
- Temperature Fluctuation
- Cylindrical for Ease of Installation
- Weight Less Than 5 lbs.

PACIFIC AIRMOTIVE CORP.
MANUFACTURING • ENGINE DIVISION • AIRFRAME DIVISION • PARTS SUPPLY
SURBANK, CALIFORNIA
Other Divisions: Oakland and Chico, Calif. Seattle, Wash.



**MANUFACTURING
DIVISION**

San Francisco, Calif. • Los Angeles, Calif.

more money than is paid elsewhere. But the incentive scheme may be of some help in converting that drawback to a credit.

Sweden is expected to produce Swifts, the RAF's new production fighter which was developed from the basic Attacker layout. The Swift has swept wings and is powered by a Rolls-Royce Avon turbojet. But in spite of the much-publicized statement that the RAF had ordered this fighter "off the drawing board," Supermarine management did not—at the time of my visit—long seem a little of a zealot to mass production of the Swift.

This could be because the RAF does not order aircraft at all—that is a function of the Ministry of Supply. The RAF could have aided the Swift to enter the craft while it was still on the boards, but lots of paperwork still has to intervene between order and production.

► **American Competition.**—All during my visit at Sweden, I had the feeling that it was most like General's plant at Fort Wayne. There are pacifiers—both plants are producing an elderly, heavily armed jet fighter for naval use, both plants are of about the same age, and general design.

Even the planes—Attacker and Panther—are similar, being straight-winged, turbojet-powered and a standard type of naval controls. Both firms have a long tradition of fine aircraft and high wartime production behind them.

Many of the Swedish staff have an "American" attitude about aircraft production—they feel that more and more airplanes have to be built faster and faster. And they have been quick to begin traditions when it comes to bottlenecks, something that other British factories could learn to advantage.

So Supermarine's size is as the an oversize—on the Swift goes into full-scale production, Sweden and satellites are going to be one group of the three or four most important aircraft producers in the world. And I got the impression feeling that they are equipped to handle the job.

U. S. Mission Orders Italian Tools

(McGraw-Hill World News)
Rome—As part of a program to ease the shortage of critical machine tools in the U. S., a mission of Wright Aeronautical Corp. and Corbin-Wright Industries has negotiated initial orders for some \$1.5-million worth of Italian tools for use by the American aviation industry.

The mission is dealing with the Union of Italian Machine Tools Constructors (UCIMA).

AVIATION WEEK, October 26, 1951



VINCO IS MASS PRODUCING PARTS FOR THIS MAN

He knew he could depend upon Vinco to deliver as specified, so he went fishing. Such confidence is the result of Vinco "METAL-WORKING WIREWORK" which has been proven for more than 20 years. Whether it's gears, parts, assemblies or design and make, Vinco invariably will devise methods to deliver the job with low cost and at low cost.

VINCO CORPORATION
100 SCHAEFER HIGHWAY
DETROIT 16, MICH.

MASS PRODUCTION OF PARTS AND ASSEMBLIES
GEARS, SPINDLES
ENGINEERING
DESIGNERS

VINCO
MILLIONS OF LBS.
INCH P.O. 1001

THE TRADEMARK OF DEPENDABILITY




CONFIDENTIAL.....MODEL 5185
471 Cu. In. Displ. — 165 h.p. at 2200 r.p.m.

**SOUNDLY ENGINEERED
PRECISION BUILT**

— AND BACKED BY —



**FOR TOP
UTILITY
CHOOSE A LIGHTPLANE
WITH
CONTINENTAL
POWER**

Continental Motors Corporation
Aircraft Engine Division
MUSKOGEE, MICHIGAN

Plotter for Graphs

An automatic plotter that plots 40 points per minute on graph paper operates from digital data furnished by IBM cards or by a keyboard.

Known as the Teleplotter, the unit runs digital electric counters and photo electric reading head which controls the graph paper's lines and spaces in perpendicular directions.

Developer of the device—Teleplotter Engineering Corp., Bala Cynwyd, Pa.—says that the photoelectric scanning is fast and accurate and gives plotting accuracy independent of paper stretch and drawing accuracy.

Linear or logarithmic graph paper may be used, five modes of operation are available for each axis, and five symbols per inch can be plotted on the same paper.



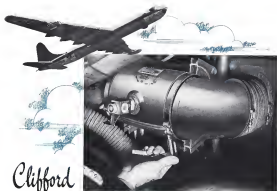
Tower Tests Effect Of Supersonic Flight

A preview of the effects of vibration and oscillation on aircraft components in supersonic flight will be obtained with a new test tower recently completed at Bell Aircraft Corp.

The rig will handle parts weighing up to 3,000 lb. and will be capable of introducing vibrations ranging from 5 ft. to a few inches with a frequency from 1 to 15 cps.

► **Picture Power**—The 48-ft.-high and 15-ft. square steel tower is supported on a 4-ft.-thick concrete base. The component under test is suspended by slack cords attached to two retro-driven pulleys branching the power.

One of these pulleys is anchored to the base of the tower, while the other is



Clifford Feather Weights Cool the Oil in

CONVAIR B-36D BOMBERS

World's largest bomber, the Convaire B-36D, has a 10,000 mile range and a ceiling of over 40,000 feet.

It uses a Clifford oil cooler to get rid of the heat generated in the cool oil used since which feeds the engine in the B-36D main observer. The oil cooler is mounted in the proper position of the oil and under the wing, and has a feathered oil flow, and permits the use of a smaller size and lower weight drive.

Conventional or jet powered, civilian aircraft or world's largest bomber... all types of modern aircraft depend on Clifford Feather Weight Air-Aluminum Oil Coolers... the only advanced type of oil cooler. Their superior weight-strength ratio is achieved through Clifford's patented bearing method and pre-testing in Clifford's wind tunnel laboratory... the largest and most modern in the aeronautical heat exchanger industry. For further details, write Clifford Manufacturing Company, 225 Grove Street, Waltham 54, Mass. Division of Standard-Thomson Corporation. Sales offices in New York 17, Detroit, Chicago 1, Los Angeles.



**ALL-ALUMINUM OIL COOLERS
FOR AIRCRAFT ENGINES**

**HYDRAULICALLY-FORMED BELLOWS
AND BELLOWS ASSEMBLIES**



operated from a crossbeam at the top. A bell crank lever regulates the spring rates controlling the frequency and stroke of the piston. An oil system operated by differential gas pressure supplies lubrication to moving parts during vibration operations.

► **Task Studies.** First-First test project will be the study of vibration effects on various types of aircraft and mobile tanks. A pump system will pump viscous oil into measurement of liquid extracted from the tank during the test, to record effects of this withdrawal.

Design and development of the tower was guided by Bell engineers Herb Hlad and Ed Farnes with the cooperation of Joe MacFarland of the project group. Structural details were completed by plant engineering's Clyde Farnet.

British Open Contest For Copter Studies

An annual prize of £25 (\$70) is being offered by the Helicopter Association of Great Britain for the best technical paper on any subject connected with rotary-wing aircraft. The paper will be chosen at the Gurnea Memorial Prize Dinner at home of Bessie Dow Jones de la Cueva and her group meeting with in the field of rotary-wing flight.

Entries must be original, not previously submitted to any other body and not previously published. Copyright of the winning paper becomes the property of the association and no payment will be made.

Competitors need not be association members, and they may be of any nationality.

► **Subject.** Studies in the field of aeronautical science and engineering, in an operations, administration, maintenance, navigation, safety or economic of rotary wing craft. Purely historical or journalistic aspects will not be eligible.

► **Language.** English preferably, but French and German are acceptable.

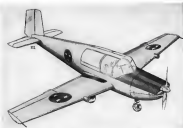
► **Length.** Recommended not to exceed 5,000 words.

► **Style.** Three copies, manuscriptation will not be considered. All diagrams or figures must be drawn on separate ink and either submitted as separate or drawn on tracing paper for reproduction.

► **Deadline.** Entries for 1951/1952 must be received by Mar. 31, 1952.

► **Age limit.** Competitors must be under 35 years of age on Dec. 31, 1951. Date of birth must be stated. Competitors must be prepared to furnish proof of birth date if requested to do so.

► **Address.** Helicopter Association of Great Britain, London House, 15 Park Lane, London, W. 1, England.



SAFIR TRAINER is shown above in artist's drawing and below in flight.



New Swedish Air Force Trainer

More powerful version of Safir has 190 hp. Lycoming engine, boasts top speed of 171 mph., seats three.

The Royal Swedish Air Force gets a new trainer—the Safir-91 B, a newer, more powerful, three-seat version of the Safir—but it's not to be built at home. Instead, the production order goes to subcontract, from the Sase Aircraft Co., the parent firm, to the Dutch shipbuilders De Schelde, which also operates as a aircraft factory at Eindhoven near Rotterdam.

The new craft is designated Sk 91 by the Swedish Air Force, and it is intended to replace the Bantier Bedroom (Sk 35). Because of other current military commitments, the plane could not be built in Sweden.

► **From Experience.** The original Safir version has had about ten years experience and operations all over the world. It has been used as a trainer for the Netherlands Government Civil Flying School and by the Imperial Ethiopian Air Force.

The 91 B differs from the Safir in having a more powerful engine. The original version carried the de Havilland 145 hp. Gipsy Major 10, the 91 B has a 190-hp. Lycoming O-435-A flat six. The results are higher speed, better climb and a higher service ceiling. Increased loadings of the new model has increased the range.

A Hartzell variable-pitch propeller is fitted. Other improvements include a new heating and ventilating system, improved instruments with dual light instrument panels, dual fuel and throttle and enlarged cabin windows for improved all-weather. Cabin heating is adjustable.

Wingspan of the 91 B is 34 ft 9 in., length, 25 ft 9 in., height, 7 ft 2 in. Wing area is 146 sq ft. Gross weight is 2,505 lb.; empty weight is 1,530. Maximum speed is 171 mph., sea level rate of climb is 1,140 fpm.

Convair pioneers 1st atomic plane!

It's no longer just theory. Convair's exceptional engineering talents will be employed to harness atomic power to aircraft performance! The U. S. Air Force has awarded Convair the contract to develop America's first atomic-powered airplane, and General Electric—working jointly with Convair—will develop its nuclear propulsion system. The job will be done...adding another first to the already impressive list of Convair's achievements in designing aircraft of the future. This contract is still another tribute to Convair research-engineering production teams...and to the far-sighted corporate management which makes A-plans development possible!

ENGINEERING TO THE "Nth" POWER...developed The Air Force, Atomic Energy Commission, Convair and General Electric are working closely together to advance America's defense program. Always the goal at Convair: for the protection of power to achieve the maximum degree of performance. The maximum, the Nth degree of air power...the Nth Power—Atomic Power!

ENGINEERING TO THE Nth POWER

In the air it's

CONVAIR

CONSOLIDATED AVIATION AIRCRAFT CORPORATION • SAN DIEGO, CALIFORNIA • POMONA, CALIFORNIA • FORT WORTH, TEXAS

PROBLEM... Dependable power in a small package!
SOLUTION... LEDEX ROTARY SOLENOIDS

The compact rotary action of Ledge Solenoids is at work assuring dependable operation in a multitude of products. Ledge engineers will work with you to produce the most efficient applications of Ledge Rotary Solenoids for your products.

Available in six sizes, rotary strokes up to 95", torque up to 50 pound-inches... with many types of power packages. Write today for complete information.

G. H. Leland Inc.

1200 WILSON ROAD, CLEVELAND 13, OHIO

Long Line

Ford Aircraft Engine division is building a 24-in. long conveyor system in its 4.1-million sq. ft. main assembly plant at Chicago for mass production of Pratt & Whitney R-4100-33, R-4100-39 and R-4100-63 engines. The 42-million conveyor network is scheduled to be completed in November. It will include 154 bents and bridge cranes, 4,700 ft. of bridge crane runways, 130 vertical assembly dollies and 50 horizontal dollies.

Assembly plans call for breakdown of the engines into six major divisions: power section, cylinder, nose, accessories, supercharger, and drum. Power conveyor main lines will be used for the gross assembly, top-down and final assembly lines. Assembly lines will be fed into the main assembly lines by six major assembly carriers, and similarly six major parts carriers will transport the disassembled parts from the teardown line for inspection and major repair before final assembly.

Electronic Scale Records Weights

One of the latest applications of electronics is in the field of weighing.

An electronic scale and recorder that will weigh objects with great accuracy and record in print the information at any remote location, has been placed on the market by the Sinton-Amet Co., Chicago.

The compact unit is made up of a Baldwin-Leno-Hamilton load cell, whose primary component is a Wheatstone bridge, and the secondary unit is a microprocessor to convert the electrical output of the cell to mechanical energy for the electronic scale's recorder.

How It Works—Deflection due to load causes a voltage change in the Wheatstone bridge. A microprocessor can compensate for temperature changes which might affect the readings.

Calls are designed to operate at 120% of capacity and load up to 120% should cause no damage except, perhaps, a shift in the zero position which may easily be reset.

The current passes through an angle iron in a zero balancing system which indicates a constant percentage weight. The system is in balance again. The motor also drives the recording system. (This circuit is phase sensitive and when present on the load cell it



THOMPSON Extra-Landings RETREADS

Used on Boeing Stearadivers by Pan-American, Northwest, and British Overseas

with 100,000 Safety Records

USED MORE THAN ALL OTHER RECONDITIONED TIRES by AIRLINES THROUGHOUT THE WORLD!

The unsurpassed safety, dependability and wearability of Thompson Extra-Landings Retreads have been proved by nearly 100,000 airplane tires retreaded by Thompson. They provide far more landings and less frequent wheel changes. Each tread is built with precision workmanship and each tire is balanced perfectly.

A Thompson Extra-Landings Retread is safer than a new tire because the strength of its casing has already been proved in actual service. A safe casing can be retreaded over and over again... often as high as five times!

Thompson Extra-Landings Retreads are the product of years of specialized experience in developing safe and superior retreading for all aircraft. Thompson Treads provide many more landings per new tire dollar. Write, wire or phone the nearest Thompson plant for prompt and efficient service.

THOMPSON Aircraft Tire CORPORATION

World's Largest Retreader of Airplane Tires

EASTERN PLANT
International Airport • Miami 40, Florida
Phone 85-1681

WESTERN PLANT
11th & Minnesota Sts. • San Francisco 7, Calif.
Mission 7-7220

Maximum performance under rugged competitive operating conditions

OFFER A "DEAD BEAT" WITH NO OVERSHOOT

VAPOR AIRCRAFT TEMPERATURE CONTROLS

The stabilization time of Vapor Controls was such that if a temperature change of 150° was obtained manually in two seconds, the control under identical conditions would only require five seconds to reach and stabilize at this new temperature; i.e., the control would "dead beat" for practically every control point change with no overshoot.

Featuring a linear (dead) band adjustable from zero to infinite, Vapor Controls are accurate and have a decided advantage over converging band controls. Voltage variations of from 105 to 125 volts do not change the characteristics of Vapor Controls.

An important point brought out during the aircraft engineering conference was that all agreed that Vapor Controls had infinite versatility and maximum potential for use. For details write . . .

VAPOR HEATING CORPORATION 400 EAST JACKSON BLVD. • CHICAGO 4, ILL.
 100 PHIL. • NEW YORK 10 • PORTLAND • WASHINGTON • MILWAUKEE
 SAN FRANCISCO • JACKSONVILLE • BIRMINGHAM • DETROIT • ALBANY • LOS ANGELES

corrected, the cone reverses, bringing potentiometer back to original position.)

The recording apparatus is made up of a series of slip cases which convert rotational information from the auditor to digital information on the pen. Another cone activates a slinky which is faced against the tape and type wheel, printing data derived on a read, ledger sheet, tape or other medium.

Glass Textile Firm Buys Tape Concern

Ben, Goldsmith & Co., Inc., a major supplier of broad glass fabric to the aircraft, electrical, plastics and other industries, and a joint and subcontractor to the USAF, Navy and Army, has taken a major step into the narrow industrial type field by purchasing the assets of Horace Linton & Son, Inc., Philadelphia.

The new acquisition will operate as the Horace Linton division and its former president, Wallace R. Linton, has been appointed vice president and general manager. Sales responsibility has been assumed by Raymond F. Clark, vice-president sales for Ben, Goldsmith.

Broad glass fabricers are goods over 24 inches wide and are used in fabrication of radomes, hangar's structural components and numerous other applications. Narrow industrial tapes run up to approximately 34 inches wide, are widely used in electrical machines.

How To Be Cleared

"How to be Cleared for Handling Classified Military Information Within Industry" is a new booklet aimed at prospective military business leaders in construction, explaining in question and answer form how clearances are made and what they cover. The booklet, costing ten cents, is available from the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D. C.

Amazing Aircraft Finish

Avex

Sky-high in Quality!

CHAMBERLAIN AVIATION, INC.
 AUSTIN 5, TEXAS

AVIATION WEEK, October 29, 1961



Below, the Canberra demonstrates its amazing speed and maneuverability in aerial maneuvers. Above, the Canberra is seen in flight over the Martin factory.

Wings to Shrink the World

For the carry. The timeless speed that finished the twin-jet Canberra light bomber across the Atlantic in record-setting time of 4 hours and 39 minutes—the soaring leap and blurring roll that signaled its arrival at the Martin airport—these formed the tactical effectiveness of the night intruder version of the Canberra being developed by Martin for the United States Air Force.

Combining that fighter-like speed and maneuverability of the basic design by the English Electric Co., Ltd., with the advanced armament, electronic and engineering of the Air Force-Martin team, the B-57A reflects the growing potency of our tactical air power—assuring that enemy troops will neither run nor move safely under cover of darkness.



Martin

AIRCRAFT

Bellevue, Washington • 1961-1962

The Glenn L. Martin Company, Bellevue 3, WA.

Use New Technique in Engine Assembly

Assembly line techniques at Wright Aeronautical Corp. are being emphasized to speed put-together of the J-45.

Engine parts will converge on a series of lift and put mechanisms, each of which will be a feed-in for the vertical assembly of a single powerplant.

The circular floor-put is about 11 ft. deep and houses a hydraulic lift, fed by a steel platform. Once the platform is rolled a steel dolly sets which the wheels may be locked.

With the dolly deck positioned about 1 ft. above floor level, the assembly operation begins at the rear, each successive component being added to the tail. As the assembly progresses, the lift is lowered to keep the work at a convenient height.

► **For Convenience**—This method of vertical assembly is more convenient than the horizontal approach, says Wright Aero engineers, particularly for the installation of rotor and turbine wheels, and is better adapted for the fit against a length.

When the engine is built up, it will be lifted off the line on its dolly and placed on a special rotating rig that facilitates installation of test equipment. It is rolled to the test block in this same rig.

At a recent showing of one of the previous production J-45s being put together for a testing and assembly stand check, it was noted that the engine section was made of steel. In the British counterpart—the Sapphire—the part is aluminum alloy. This change undoubtedly was incorporated for additional strength.

Also different from the British engine will be the J-45's auxiliary power-turbine requirements and form of their intake, and some accessory paths are being altered.

► **Fuel Delivery**—A wing into the aft end of the engine as it was joined to the lowered vertical lift showed the auxiliary combustion chamber with its system of ducts, and its separating tubes for fuel delivery. These point upstream, directing the vaporous fuel to the injection area.

With its 13-stage rotor, the J-45 probably will have the highest compression ratio of any single-stage compressor jet.

Company engineers, in collaboration with a firm of coastal coastal specialists, also have devised an efficient, molting system for its jet test cell. This system is fitted with a combination of small absorbing panels and fixed chambers for its NACA's Cleveland lab, and Martin aircraft units are used for jet exhaust.



ROCKET MOTOR, its into tail of jet fighter and provides auxiliary power in flight.

Details of British Snarler Revealed

Latest proposals seek to correct old Britain's accuracy but in America, Snarler's Snarler is an auxiliary rocket motor intended to boost a jet fighter's push at takeoff, on climb and in high-altitude flight (Aeronautics News Sept. 26, p. 221).

This is Britain's first "hot" type rocket, using liquid oxygen and water-methanol for fuel, as distinguished from the "cold" type de Havilland Sprite, which uses hydrogen peroxide and a catalyst for fuel.

The Snarler develops 2,000 lb. thrust at sea level, weighs 275 lb. dry, and will fit a space of 3 x 6 ft. (Reports are that at about 50,000 ft., its thrust will increase approximately 12%.)

It has been lighted in extensive trials with the Hawker P.1072 experimental fighter (the P.1072 was con-

verted from the original P.1070, prototype Snarler).

The motor, of course, has no self-control, and maintenance is expected to be about three minutes at full thrust. Main components break down into three categories—the main-segment down pump, the valve system, and the combustion chamber. The chamber is cooled by the water-methanol solution before the latter is mixed with the liquid oxygen for combustion.

The top photos, showing component details of the Snarler in the P.1072, reveals (1) accessory gearbox and pump, (2) nitrogen bottles, (3) air filter and driver, (4) nitrogen releasing valve, (5) pressure operated switches, (6) solenoid operated air valve.



Connector Problem?

...We'll take it from **HERE**

Good ideas for electronic circuitry sometimes run afoul of connector problems. Maybe existing connector units won't hold air pressure gradients, won't stand the heat, aren't rugged enough for the job. Or maybe it's a question of altitude, or underwater applications. But if you can sketch the circuit, we'll take it from there. We've engineered so many special connectors, solved so many "impossible" problems, that whatever the requirements are, we can usually provide the answer.



WRITE TODAY for specific information, or send us your sketches. We'll handle recommendations promptly.

BREEZE Special CONNECTORS

BREEZE CORPORATIONS, INC.

41 South Sixth Street

North, New Jersey



Removable pins in Breeze connectors speed soldering, save time, trouble. They snap back into place.



Tech-Forge flexible Couplings

for extra
strength and
resilience—plus
lighter weight

Standard Thomson Tech-Forge bellows make the ideal flexible coupling for practically every aircraft

use—exhaust, cabin heating, de-icing systems, etc. Forged and fabricated by an exclusive process, standard Tech-Forge bellows can be furnished in sizes from $\frac{1}{2}$ to 16" I.D. In any size, the Tech-Forge process assures minimum distortion of the fabricated metal, so that comparatively light-gauge metals can be used to advantage, without loss of strength. For full engineering details, or recommended specifications, write:

STANDARD-THOMSON CORPORATION • DAYTON 2, OHIO

Standard-Thomson

Makers of USAF-approved bellows • valves • lights



Shut-off
Valves



Barometric
Pressure Valves



Cockpit
Lamp Assembly



Vaporproof
Cabin Lamp

Thompson Extends Its Avionics Outlook

Thompson Products has added a unit to its recently formed Electronics Division, with purchase of Avionics Research Laboratory, Columbus, Ohio.

With the purchase, the Cleveland manufacturer moves into the rapidly expanding microwave avionics field and requires a group of engineers who are expected to become the nucleus of a growing division. Robert Jacques, who headed Avionics Research Lab, has been named chief engineer of the Electronics Division by A. L. Fennerty, acting manager.

Until now, the division has had as its only product the control switch formerly announced a year ago.

Production of the microwave avionics will be in Tippeco's main plant at Cleveland with the newly acquired Columbus laboratory and leased machine shop there retained for research and development work as well as some production work.

Dwight Lowry, in addition to acquiring the microwave avionics Tippeco also secured ownership of an electronic device used in the field by military radar operators to absorb the power that would normally be transmitted by the radar set through its antenna, and so far known as the "dummy load."

In practice the "dummy load" replaces the antenna for test purposes. If it were not used, hostile radar operators would be able to locate our radar during calibration procedure. The energy put out by the radar is dissipated into the "dummy load."

In addition to the military market, Tippeco sees direct and potential commercial possibilities, especially with the advent of ultra high frequency TV. Its new UHF antenna, considerably smaller than existing designs serving home TV sets, is a design more critical with regard to electronic performance and will do a better job on both black and white and color TV.

Tucson 'Sells' Self To Electronics Firm

The city of Tucson, Ariz., has found it pays to offer inducements to manufacturers. By agreeing to construct water and sewer lines, a railroad spur, and offering other assistance, the city persuaded the Haggen Co. to build a multistation electronic plant in Tucson.

The initial plant development will be about 97 acres.

The Tucson Airport Authority, which deals with the Haggen Co., agreed to do \$499,000 worth of work in order to acquire the plant.

Continuous Belt Circuit Baker

A small continuous-belt furnace, designed primarily for firing heated production runs of printed circuitry, has been designed and constructed at the National Bureau of Standards.

So far the furnace has proven highly useful in the Bureau's laboratory. Firing capacity is fully adequate to the needs, even though areas batch-type furnaces previously used proved frequently inadequate.

Flow space requirements of the unit are 26 by 34 in.

► Preheating Preheat-A after point is used at NBS for printing the circuits. This fluid consists of finely powdered metallic silver, an organic vehicle and solvent, and a flux. The circuit pattern is printed on ceramic or glass plate by a stencil screen process and the plate is fired.

Firing drives off the vehicle and solvent, sinterizes the flux and causes partial sintering of the silver particles, the result is a durable heated metallic film of high conductivity.

Operation of the furnace is simple. A continuously running horizontal metal belt carries the material to be fired into the furnace at one end and delivers the finished product at the other.

Generally, printed plates are fired at 1150°F and spend a little over an hour from cold input to cold output.

Plates are stacked six deep on the belt, which is four inches wide. At the metal belt end, 800 sq. in. of plates can be fired in one hour.

Temperature of the furnace can be controlled electronically to within 7 deg. up to 2000°F.

Food rate of the belt can be controlled through changes in the preheating time of glass, belts and metal plates. Firing cycles can be adjusted from 25 to 205 min.

Highspeed Machine Hobs Gears Faster

A highspeed gear hobber "employing new principles for faster hob-grinding of accurate gears and splines" has been announced by Melgus Tool Co., Detroit, Mich.

While continuous speed refinement may have to await development of suitable outside belts, the machine already cuts and grinds at rates approaching "cavalry" speeds up the firm. In only 50 sec., for example, it will produce two helical gears having 32 teeth, 14 in. dia., two-in. total face width, 6 pitch gears.

Intended to produce virtually all sizes of gears manufactured in high production, this horizontal angle-axial ma-

FLASH

NAVIGATION LIGHTS

WITH THE VAN DUSEN BLINK-R

the navigation light flasher most widely used today.



Tested • Approved • Accepted
Unmatched for reliability

NOW STANDARD ON THESE AIRCRAFT:
 Bell H-130 • Cessna L-19
 Delfield L-131 • Miller H-2
 and loads of other aircraft

Van Dusen

AIRCRAFT
SUPPLIES

Minneapolis, Minn. • Teaneck, N.J. • Boston, Mass.

HANSEN

COUPLINGS GIVE YOU

2 BIG ADVANTAGES



- 1. Quick Connection and Disconnection
- 2. Locked Automatic Bow or Slip-Off

- With Hansen couplings you can perform maintenance easily and change size combinations when you choose or disassemble a fixed line coupling gear, fixed or grooved.
- To disassemble, you merely push down the center-line pins and remove. To disassemble, pull back down on center-line pins and disassemble. There is no self-sealing, and no maintenance.

One-way shafts, pin-and-shaft, and straight-through types. If you are solving space problems, look for these types.



DISMANTLING
EASY
REPAIRING
EASY
NO LUB
NO LUB



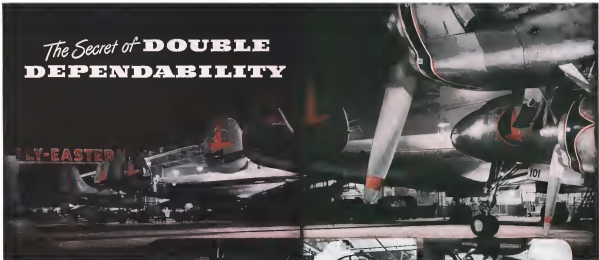
REPAIRING
EASY
NO LUB
NO LUB



REPAIRING
EASY
NO LUB
NO LUB

THE HANSEN MANUFACTURING COMPANY
 401 WEST 10th STREET • CLEVELAND 11, OHIO

The Secret of **DOUBLE DEPENDABILITY**



Everywhere in Eastern Air Lines' great maintenance base one sees concrete signs of its deep concern for safe, dependable air travel. Every operation is performed, every decision is made, with this principle in mind.

It is doubly significant, therefore, that Eastern has selected Sinclair to handle its vital lubrication needs.



Flows Taking Its Physical: Eastern's Miami base—one of the world's largest, most complete maintenance centers. About once a week, every airplane returns here for a major examination.



They Double Check in the double dependability. On each major engine overhaul Eastern experts take 100 man hours—many more hours than standard requirements. Many of the tests and checks made are exclusive with Eastern, too.



Eastern Takes No Chances with engine lubrication, either. Only Sinclair Aircraft Oil is used in the Great Silver Fleet. Sinclair lubricants protect tires, provide fuel, safety and engine lubrication.

SINCLAIR

AIRCRAFT OIL for double dependability
AVIATION SALES, 860 FIFTH AVENUE, NEW YORK CITY

You get more . . .
you save more with

CHEVROLET

ADVANCE-DESIGN TRUCKS

*First in demand
First in value
First in sales*

Whatever the job you have for a truck, Chevrolet has the truck that's right for your job! It's a new Chevrolet Advance-Design truck, built to cut your trucking costs down to rock bottom. Saves you money when you buy, because the purchase price is low. Saves money right along, because no other truck in its price class offers the great combination of ruggedness, durability and economy you get in Chevrolet. Just look at the extra value features that make Chevrolet trucks stand up better, handle easier, cut time to run and maintain. Your best truck deal is the deal you get on a Chevrolet Advance-Design truck at your Chevrolet dealer's.

CHEVROLET DIVISION OF GENERAL MOTORS
DETROIT 4, MICHIGAN

CHEVROLET

ADVANCE-DESIGN TRUCK FEATURES

TWO GREAT VALVE-IN-HEAD ENGINES—the 105-hp. Landmaster or the 72-hp. Trailmaster—to give you greater power per gallon, lower cost per load • **POWER-JET CARBURETOR**—for smooth, quick throttle response • **DIAPHRAGM SPRING CLUTCH**—for easy-start, longer-life • **SYNCHRO-MESH TRANSMISSION**—for fast, smooth shifting • **HYPOID REAR AXLES**—for dependability and long life • **NEW TORQUE-ACTION BRAKES**—for light-duty models • **PROVED IMPROVABLE DOUBLE-ACTUATED BRAKES**—for medium-duty models • **NEW TWO-ACTION REAR BRAKES**—for heavy-duty models • **NEW DUAL-SHOE PARKING BRAKE**—for greater holding ability on heavy-duty models • **NEW CAR SEATS**—for complete riding comfort • **NEW VENTILATES**—for improved air ventilation • **WIDE-BASE WHEELS**—for improved tire mileage • **RAIL-TYPE STEERING**—for easier handling • **UNIT-ENGINE BODIES**—for greater load protection • **ADVANCE-DESIGN STEERING**—for increased comfort and easier appearance

class will handle any load in your gear or plus up to 8 in. dia. and 44 in. long well.

Operation is said to be extremely simple, one man can operate two or more machines with one. Setup is rapid and changeover for a gear of different belt takes only about 20 min., the firm says. Construction permits manual or automatic loading and belt shifting (push-button control). Handling can be done in conventional.

The loader is designed to cut gear automatically at belt speeds speeds up to 1000 rpm (according to 1500 rpm for a 5-in. dia. belt), at feed up to 4 in. per hob direct per revolution of

work. According to Michigan, accuracy appears to be dependent on tooth rather than on machine condition. All cutting parts are precisely fitted. Rigidity has been provided not only in the structural elements, but in the operating units. The new tool is said to be notably smooth and lacking in vibration. Drive arrangements have been accomplished through use of positive dual hydraulic levers. Torsional deflection is reduced to a minimum by use of greatly over-size gears and shafts.

This new addition to the deftline line, requires floor space of 84 x 84 in. Over all height, including hob-die floor, is about eight ft. Weight is 23,000 lb.

Our Expanding Industry . . .

Ryan Aeronautical Co., San Diego, has established a service, testing, development agency to coordinate experimental work in adapting blowers to replace exhaust systems. Now in production of aluminum steel engine cooled exhaust systems for aircraft, Ryan is conducting experimental work on jet engine components as well as on other exhaust systems, including those for Army tanks.

Molten Co., Inc., Los Angeles, is in production of its new \$500,000 metal products division, with firm orders and letters of intent from Nathrop and Coover for tool engineering and manufacturing and production of aircraft sub-assemblies.

Abnorton Goods Mfg. Co., Manitowish, Wis., a leading manufacturer of cooking stoves, is producing parts for F-84 Thunderjet fighters and will expand facilities for increased defense work. Company produced wide range of aircraft components during World War II.

General Electric's major appliance division expects to be in production of jet engine parts at Louisville, Ky., by next spring. Some members of the department have arrived in Louisville to set up for operations. Eventually other major appliance division will be moved from Bridgeport, Conn., to new Louisville office.

Sprague Engineering & Sales, Corvallis, Calif., with a substantial backlog of sword fences, valves and small company orders for test equipment, has been incorporated under California laws to facilitate financing. Company good, sets include processed coils, valves, solenoid, hydraulic system, test, but flow test benches, jet engine accessory and high pressure test stands.

American Helicopter Co., Inc., Montclair, N.J., has opened a new \$1,000,000 jet helicopter development manufacturing and test facility at Paterson, N.J. Company has backlog of patrol AF helicopter and police powerjet orders.

FOR LIGHTER, STRONGER EXTERNAL FUEL TANKS CALL



PASTUSHIN

Pastushin Aviation Corporation offers complete plant facilities—designing, engineering, tooling, fabrication, heat treating and sanding for volume production of fuel tanks and other aircraft components.



This 250 gallon jet-engine fuel tank, designed and engineered by Pastushin, is in production for the U.S. Air Force.

With Pastushin's newly developed Metal Forming Process steel or aluminum can be formed into spherical-contoured parts at great savings in time and money. If you have a metal forming problem see Pastushin first.

PASTUSHIN AVIATION CORP.

Dept. A-14
5851 West Century Blvd.
Los Angeles 45, Calif.



Plymouth Division of the Chrysler Corp. is adding \$40,000,000 in jet space at its Los Angeles plant where it will build a multi-million-dollar contract for Douglas C-124 Globemaster II aircraft (10 in. plus). Components now are being manufactured at the Douglas Santa Monica plant. Complete change-over to Plymouth is expected during January, 1953.



EQUIPMENT

New Ideas Spark Ignition Conference

Spark Plug Service Experience*

Engine	Model	Lead Content at Start	Removal Time (Sec)	Cost per Hour	Total Life (Hr)
R-2800 Engine (w/ water injection), low tension ignition system, R375-1 plug					
GA-1	100-4	2.5	100	1.0	1000
GA-2	100-4	4.0	100	1.0	1000
GA-3	100-4	2.5	100	1.0	1000
GA-4	100-4	2.5	100	1.0	1000
GA-5	100-4	2.5	100	1.0	1000

R-3350 Engine, R375-1 plug

GA-1	100-4	2.5	100	1.0	1000
GA-2	100-4	4.0	100	1.0	1000
GA-3	100-4	2.5	100	1.0	1000
GA-4	100-4	2.5	100	1.0	1000
GA-5	100-4	2.5	100	1.0	1000
GA-6	100-4	2.5	100	1.0	1000
GA-7	100-4	2.5	100	1.0	1000
GA-8	100-4	2.5	100	1.0	1000
GA-9	100-4	2.5	100	1.0	1000
GA-10	100-4	2.5	100	1.0	1000

R-2800 Engine (280 14-G), R375-1 plug

GA-1	100-4	2.5	100	1.0	1000
GA-2	100-4	4.0	100	1.0	1000
GA-3	100-4	2.5	100	1.0	1000
GA-4	100-4	2.5	100	1.0	1000
GA-5	100-4	2.5	100	1.0	1000
GA-6	100-4	2.5	100	1.0	1000
GA-7	100-4	2.5	100	1.0	1000
GA-8	100-4	2.5	100	1.0	1000
GA-9	100-4	2.5	100	1.0	1000
GA-10	100-4	2.5	100	1.0	1000

* As reported at the Champion Aircraft Spark Plug and Ignition Conference by R. E. Shultz, director of research, Champion Spark Plug Co.

1. Lead content at start of engine operation.
2. Average life of engine operation.
3. Average life of engine operation.
4. Average life of engine operation.
5. Average life of engine operation.

1. Lead content at start of engine operation.
2. Average life of engine operation.
3. Average life of engine operation.
4. Average life of engine operation.
5. Average life of engine operation.

- Fuel additive scavengers lead deposit, cuts fouling.
- KIM happy with results of not cleaning its plugs.

By George L. Christian

Telene, O.-Kooty aircraft ignition problems were reviewed with considerable success by industry experts at Champion Spark Plug's recent Aircraft Spark Plug and Ignition Conference here. Among the highlights:

• Lead fouling, long a headache to our test spark plug operators, was challenged from different directions by two bright new products: Shell Oil's prodigy, TCF, a potentially reusable lead scavenger, and Champion's high energy plug, capable of firing under water through a complete coating of graphite and other spark smotherers.

• Resin, responsible for limited life of countless millions of plugs, suffered a two-pronged attack: high resistance plug that tests with 18,000 ohms instead of resistance indicated across sectors (20%), and new electrode alloy which generates no arcing current.

• Ceramic insulation, leakage of which is prime cause for pre-ignition and plug leakage, are being replaced with new glass which not start starting to roll down Champion's production line of the brand new R375 IE plug in one leakage free block.

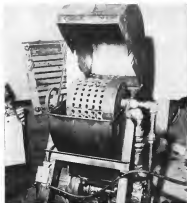
• Low tension ignition systems by Bosch are rapidly replacing the large reciprocating engine (600-R 2400, R 3150, R 4500) reducing engine life by as much as 10% at high altitudes and extending plug life.

• Engines and ignition systems, long neglected in a discussion of the spark world, are gaining wide acceptance by both military and commercial operators. But a major topic of last year's conference, the plug with the life span of an engine overhaul, gained little attention from five years.

Scavenger vs. Solvent

Shell Oil's V. E. Test addressed a paper reviewing the mechanism of spark plug fouling and the work done by his company to track down a scumlike arcing agent.

Test demonstrated that although the major constituent of the deposit was two plugs operating in a laboratory test on



NEA'S CLEANING MACHINE: seven spark plugs washed into clean. High velocity stream of cleaning fluid sprays on firing end of plug during 270 deg. turn rotation.

gas was lead impregnated (Pb-Pb), the plug with the greater deposit operated inferiorly, the low lead plug was fouled up. Therefore, lead impregnated was not directly responsible for fouling the latter plug.

Further analysis revealed the presence of metallic lead with fouling, the solvent frequently being present in 10% leads only visible with a magnifying glass. Chemical investigation proved that the conclusion drawn in the laboratory was identical to what was observed on large multi-cylinder aircraft engines—lead plugs contained metallic lead in concentrations as high as 4%. Only small quantities of metallic lead are required to disturb plug operation, the substance being an excellent electrical conductor.

• Fouling Cause—Studying the materials used by which metallic lead is formed, Shell determined that "carbon reduced lead" performed to metallic lead during medium to high engine output. The metallic lead, did not collect between the electrodes, causing a direct short, but reduced the sheet resistance and allowed the tendency of deposits to adhere to the ceramic core, causing misfiring. Another combustion chamber

material capable of reducing lead into metallic lead is rare.

Operating variables such as rich mixture ratio, extremely low cruise altitudes and low altitude and cylinder head temperatures even an appreciable effect on fouling.

Metallic lead being a very stable material not easily removed from spark plugs, a lacquer against that screen rather than solvent would be most effective. Addition were investigated which would lower metallic lead concentration in the combustion chamber, reacting indirectly with the metallic lead residue during combustion.

Literally hundreds of spark plug fouling tests revealed that the addition of an unexpected amount of trichlorophenol (TCP) gave these scavengers in action. A test plug, which lasted an average after four hours of operation on fuel containing a concentration of four ml/gal of trichlorophenol with the standard ethylene dibromide anti-oxidant, operated satisfactorily on the same fuel for 62 hr with no evidence of fouling when TCP was used as scavenging agent.

• Resin—This represented a 1,040% increase in the time for spark plug firing, in contrast with only a tenth as



Aspects designers have been specifying LORD Mountings for over a quarter of a century. There are sound reasons for such continued preference. LORD's patented, dual bonded-rubber mounting which opened the door to scientific addition of vibration, and developed the world's most complete process of removal is essential to make LORD Mountings the most effective... most dependable... most economical mounting available. Designers appreciate that LORD's mounting and expensive standards of the LORD engineers who help them find practical answers to their vibration problems.

Look For LORD Mountings Here...

- Engine Mounting Systems
- Turbine Engine Mounts
- Turbine Engine Mounts
- Turbine Engine Mounts
- Turbine Engine Mounts
- Turbine Engine Mounts
- Turbine Engine Mounts
- Turbine Engine Mounts
- Turbine Engine Mounts
- Turbine Engine Mounts

LORD MANUFACTURING COMPANY
Erie, Pennsylvania

Vibration-Control Mountings
... Bonded-Rubber Parts

Westinghouse Decelostat®

Controller Brake Equipment



IT HELPS TO S-T-R-E-T-C-H THE RUNWAY

You put a substantial "extension" on every landing strip when you equip a plane with Westinghouse Decelostat Controller Equipment. The pilot applies the selected brake pressure. The Decelostat eases and restores this pressure, as dictated by the runway condition. Skidding is banned. Tire life is increased many fold. Skidding on snow and ice is eliminated. And the maximum retardation permitted by the particular surface situation is always automatically attained.

LIGHTWEIGHT—SIMPLE—FOOLPROOF—POSITIVE
MECHANICAL LINKAGE INSTALLATION

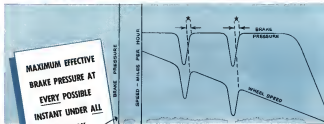


This device is designed for smallest possible size, lightest possible weight, complete simplicity and top dependability. There are no delicate parts, no complicated mechanisms.




**ELIMINATES SKIDDING
UNDER ALL
RUNWAY CONDITIONS**

**PRODUCES MAXIMUM RETARDATION
PERMITTED BY RUNWAY CONDITION...**



This diagrammatic sketch, shows at a glance the full brake pressure provided by the Decelostat's principle of operation. This full brake pressure is maintained at the wheel at all times. The Decelostat eases this pressure to conform to runway conditions—with full restoration as soon as normal adhesion is reestablished.

We'll be glad to tell you more about this important development.
Write for Literature.

AIRCRAFT DIVISION of  **Westinghouse Air Brake Company**
WILMERDING, PA.



SKYDROL brings new safety to Old World routes of LAI



Trend is safer than ever via Italian Air Lines, over routes radiating from Rome to points in Europe, Ireland, Africa and the Near East, because Monsanto Skydrol is used in the cabin superchargers of Lanes Aeronautics ships.

Skydrol, Monsanto's free-resistant-type hydraulic fluid, secures the possibility of free flow to hydraulic line failures in the air or on the ground. Skydrol, therefore, means extra protection for passengers, for air and ground crews and for aircraft carrying millions. In addition, Skydrol provides important savings in maintenance costs. It is a long-lasting fluid having high lubricity that reduces wear on working parts.

For details on how Skydrol can bring you greater safety plus efficiency under all normal operation conditions, write for a copy of the booklet, "More Safety in the Air with Monsanto Skydrol." MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 1200 South Second Street, St. Louis 4, Missouri

Advantages of Monsanto Skydrol

SKYDROL is free-resistant—meets the noncompressibility requirements of Aeronautical Material Specification 5250

SKYDROL is a proved superior lubricant. In most critical areas, lubricity is more than double that of other hydraulic fluids

SKYDROL is stable at required operating temperatures and pressures.

SKYDROL is noncorrosive to metal, metals and alloys

SKYDROL is moisture—does not require special handling or protective clothing

Circle 10 on Reader Service Card



MONSANTO CHEMICALS - PLASTICS

error for the lower load content or the assumed failure scenario." West said. This table summarizes the results obtained by Shell.

Effects of Solvents and Temperature on Plug Firing Time

Solvent	m/gal	FTT, in.	% Increase
1.0 T.E.D.S.	4.0	4 (approx)	0
1.0 T.E.D.S.	5.0	5	100
1.0 T.E.D.S.	4.0	4	0
VEP	4.0	>62	>3,180

Note: T.E.D.S. = ethylene dibromide
FTT = Plug firing time

Subsequent tests in a variety of cases revealed that TCF fuel contained in flight against fouling and no harmful effects resulted from its use. Quantity of deposits, reduced in some engines, remained essentially unchanged in others. But deposits were usually soft and powdery rather than glazed. An other advantage was substantial reduction in exhaust valve cover erosion.

► Current Status—Tetra & Whittier Aircraft conducted a 100 hr. test with TCF on a R-4100 engine, repeatedly using long leg range transport flight. Current test of the cyclic fuel/air ratio was 0.06. Examination of the plugs at the conclusion of the test, by torch and 37.6 c.

gave tests "indicated that the plug performance was substantially equivalent to that obtained on conventional clean plugs," an outstanding result.

The Shell scavenger is currently being flight tested. The company reports that results to date appear quite promising, but it is still too early to draw definite conclusions.

Plug Cleaning

Conclusions drawn in a paper by J. R. Griffin and J. K. Longmire of the Organic Chemical Dept., E. I. du Pont de Nemours & Co., on plug cleaning were that no material is yet known which will dissolve all of the deposits on aircraft spark plugs.

Effective cleaning, using high velocity jets, is of great importance in removing deposit from the firing end of the plug, the paper stated.

Hot concentrated hydrochloric acid is the most successful chemical cleaner found. Another fairly effective compound consisted of an emulsion of

Mixture	Wt. %
Concentrated Hydrochloric Acid	20
Ammonium Acetate	12.5
Orthochlorobenzene	15
Glass	3
Water	58.4

Find results, according to the paper, showed "further development of the process and the necessary equipment will be required before chemical cleaning of the aircraft spark plug can be considered a practical reality."

No Plug Cleaning

KLM has experienced the rather startling experience of reducing gross take-off weight by not cleaning them, according to G. Lam, its representative.

First clear leading to KLM's idea came when its personnel noticed that the same content of Champion plugs did not load badly, possibly because the heavy, fine-electrode configurations around the ceramic sufficiently to discourage deposits built up.

Quoting from Conair's R-2600 engine, KLM started installing Champion plugs (R375 L) and the same cleaning procedure in November, 1949. In Italy, the plugs were inspected every 100 hr.; inspection period now is up to 150 hr.

Results of the Conair test were so encouraging, the airline adopted the procedure to DC-6s and Constellations. And prominent airlines on all three levels dropped. KLM recently has been installing EC plugs in the main

HIGHER EFFICIENCY WITH BENDIX SCINFLEX ELECTRICAL CONNECTORS

MINIMUM VOLTAGE DROP



- Minimum Fuel
- Maximum Light
- Better Weight
- Single-piece design
- Vibration Proof
- Light Weight
- High Insulation Resistance
- Easy Assembly and Disassembly
- Power Parts Don't Slip off Connector
- No additional solder required

The ability to carry maximum currents with only a minimum voltage drop is an outstanding characteristic of Bendix Scinflex Electrical Connectors. This important feature is only a part of the story of Bendix Scinflex. The use of Scinflex Insulation material, an exclusive Bendix development of outstanding insulating properties, resistance to flash over and creepage to temperatures from

-57° F. to +215° F. performance is remarkable. Dielectric strength is never less than 500 volts per mil. All in all, no other electrical connector combines in any important attribute. Insulation as you will find in Bendix Scinflex connectors. For higher efficiency in your electrical connections be sure to specify Bendix Scinflex. Our sales representatives will gladly furnish additional information on request.



Scinflex high strength insulation alloy high resistance to corrosion with surface finish.

Connector high contact capacity—low resistance drop.

Scinflex electrical connector.

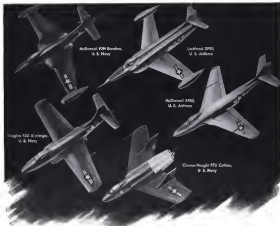
High dielectric strength. High resistance to corrosion.



SCINTILLA MAGNETO DIVISION of
BENDIX, NEW YORK



FACTORY BRANCH OFFICES:
177 E. Philadelphia Avenue, Burbank, California • 2460 North 10th, Kalamazoo, Michigan • 1000 E. 10th, Wichita, Kansas • 322 Market Street, San Francisco 4, California



Five Sound Reasons... for America's Air Might

All of these first-line fighters combine fueling speed with top dependability—characteristics that mark them as outstanding military aircraft. Significantly, each is powered by one Westinghouse turbojet engine.

In addition to the already famous J-46, Westinghouse research and engineering skill has developed the J-48 and the J-49, big brother of the Westinghouse jet engine family and the most powerful turbojet engine known to be in production anywhere.

Look to Westinghouse to continue to power the outstanding military aircraft of the future. Look to Westinghouse for constant progress in the development of more powerful and more reliable turbojet engines.

(page 2)



of the R-2900 CB16 engines on DC-6. Fuel distribution was suggested as a possible cause.

KLM, happy with its BG air plug installation, indicated that unscheduled removal rates had dropped from 10.20 to 1.2 a month.

PDW said that it is considering using a cobble plug in the new position of the engine.

New Developments

Engineers generally agreed that not enough experience had been gathered on the effect of spark advance on plug performance. They suspect that there will be little difference in spark plug operation but look to improved fuel economy as a real advantage of the system.

• **Copper Electrode Reversion.** Champion admitted that copper electrode reversion was an annoying problem. The new R-77 IE plug, casually starting into production, will have a glass seal which should solve the problem. Also, since it currently disintegrates extreme construction of the plug, the glass seal should help eliminate further construction-related engine problems.

• **Cooled Ceramic Burner.** Champion's R-78 Ceramic and 30% of all plugs scrapped were because of ceramic cracks, says. Engineers pointed out that often it is very difficult to distinguish between a crack, which will result in plug malfunctions, and a scratch, which is harmless. One method suggested for differentiating between cracks and scratches was knocking the crack with a business pen if the ink runs along the line, it is a crack.

• **Melting Copper Coater Gas.** Champion stated that the mere presence of melted copper in the center electrode does not inhibit the plug in detection. Ratings on plugs with copper melted from the center electrode are comparable with new plugs. Therefore it is reasonable to assume that loss of copper is a result, rather than a cause of a malfunctions. Investigation, for instance, sets up very severe operating conditions on a plug. Conclusions is that copper melting usually results from transient engine conditions at high heat.

• **New Plug.** Eastern Air Lines and the USAF are testing AC's newest electrode plug, the AC171. It is too early to give results.

• **More Houses at Takeoff?** The Navy's Baker Island the airlines if more horsepower is given on takeoff when five new plugs are used. Trans-Canada Air Lines, having operated both types of plugs, said that it had detected no operational difference at takeoff power. PDW, who was disappointed with the check this point, concerned that the plug's takeoff power performance was



*Aircraft
Instruments
and Controls*

*Radio
Communications
and Navigation
Equipment*

For precision
and dependability
look to KOLLSMAN



KOLLSMAN INSTRUMENT CORPORATION
BRIDGEVIEW, NEW YORK BOSTON, MASSACHUSETTS BIRMINGHAM, ALABAMA
Standard COIL PRODUCTS CO INC

DROP TANKS Always DROP

when released by
WIGGINS breakaway couplings

Light, delicate must be installed into instant action without fear of failure. WIGGINS couplings insure positive sealing under full pressure range and in all vibration conditions

Backed Right—Cross section of Wiggins main meter coupling which releases tanks as more aircraft. Available in double or single self-sealing models. In design to meet installation requirements

Let Wiggins engineers supply their expertise to your requirements

Exclusive Distributor

AIR ASSOCIATES
INCORPORATED

TELEPHONE—214 531 (Area 51, New York, N.Y.)
CHICAGO—3333 West 10th Street
SOLAR—2114 East 10th Street
DENVER—1221 Air Way
MIAMI—P.O. Box 740, Fort Meyer

Wiggins

O. B. WIGGINS
OIL TOOL CO., Inc.
2414 E. Chicago Blvd.,
Los Angeles 23, Calif.

INST-MATIC
COUPLINGS

MONITORADIO



AIRCRAFT RADIO INNOVATION!

An innovation in the field of communication radio is this low-cost singleband and dualband, AC/DC receiver, Monitoradio 300 dual AR-4, covering all aircraft communication frequencies within the 100-152 MC band. Now, all tower transmissions to incoming and outgoing aircraft can be monitored by engine room crew with the auto-off and hand key activity of all planes—private, commercial or military. Field no-

previous, service men, freight and baggage handlers . . . all receive continuous and pending personnel . . . may be kept constantly alert to immediate or pending demands on their sphere of operation. The use of this new MONITORADIO receiver is limited only by the imagination and the desire for efficiency and coordination in the world of activity that surrounds flying.

See Your Dealer—Or Write Us Today

RADIO APPARATUS CORPORATION

36 NORTH NEW STREET, INDIANAPOLIS, INDIANA • PHONE ATLANTIC 3624

practically identical. Yonovone added that he considered the hydraulic method of RMEP power transmission more accurate than the Magneto system.

Cold Starting

Engineers agreed that effective cold weather engine starting techniques are of prime importance.

As in the relative merits of the fire was versus the massive electrode plug for cold starting, Northwest Airlines reported no appreciable difference on the Boeing 377. It had some trouble with Champion plugs in the B-260, but overcame this by enlarging gaps and improving starting techniques.

TWA used the massive electrode plug in the aqueous weather it operates through. It has no trouble because it contains the aircraft in a condition where the massive electrode plug will operate as well as the fire was by either enlarging the plug, heating the engine or raising it up.

USAF commented that as advantage of the fire was plug was that it did not over-bridge, in often happens to massive electrode.

SAS volunteered that that it had no trouble starting. Champion plugged engines.

• **Fire vs. Massive.** In reply to a USAF question regarding comparative data on fire was vs. massive electrode spark plugs on low tension systems, Frangis stated that, on a test with two E7 ignitor systems, fire was plug was pulled at 850 in. increase of dual electrode leakage. The Champion went the full opposite way. Excess was on both types of plugs was about the same.

TWA said its primary reason for changing to Champion plugs was economic, the massive electrode plug being much cheaper than the fire (platinum) was plug. It added that the unscheduled material cost required somewhat with the changeover.

• **Fire Lion Mirrors.** PAWA asserted that fire was plugs were capable of doing 54.6 better contacts than massive electrode plug-systems whose fuel/air ratio was 0.055.

Wright Aeronautical has found that certain engines require larger gaps (with either type of plug) than others. Examples: the R-1350 required engine spark plugs with gaps set in the .015 to .020 in. range and the R-1390 gap set to .010 in.

PAWA claimed that there was no difference in the discharge characteristics of the two types of plugs.

Evaluation

The USAF offered their comments concerning the AC131 spark plug selection strength is good, engine due

LET'S HAVE 300
AN4—32A



EASY to locate
to the assembly line

Save yourself "Red Tape"
Specify the packages sealed
with Source Inspection
tape



EASY to inventory

Source Inspected-Bonded Stock

AIRCRAFT FASTENERS

• Here's a great innovation in the history of the Aircraft Hardware business. You can get aircraft fasteners that have been inspected at the source . . . and bonded for your protection.

The leaders of the Aircraft Fastener Industry have set up this system at the request of aircraft manufacturers. It eliminates certification paper work, reduces mixing of types and sizes to a minimum, and simplifies product identification. Additionally, inventory control and stockroom inventories are made easier and more efficient and "surplus" can be disposed of with a minimum of time-wasting confusion.

Now, especially, with the ever-increasing production of military aircraft, every aircraft manufacturer should insist on this efficient money saving service.

Source Inspected—Bonded Stock



**Lamson
+ Sessions**



AIRCRAFT FASTENERS

The LAMSON & SESSIONS Co. • General Office: 1971 West 25th Street • Cleveland 3, Ohio

Branch at Cleveland and Kent, Ohio • Birmingham • Chicago

First in SAFETY

Getting urgently needed equipment and supplies to troops in difficult terrain has always been a decisive factor in warfare. Switlik Switlik and other pioneer parachute manufacturers reasoned that the materials could be dropped with properly designed parachutes. Then began the experiments with cloth and design from which grew today's cargo chutes. Thanks to this research and development, it is now possible to safely drop delicate equipment, medical supplies, food and other materials.

Another first through research for greater safety.



SWITLIK
PARACHUTE COMPANY, INC.



64 LOR AND HANCOCK STREETS, TRENTON, NEW JERSEY, U. S. A.

schematic indispensable. In the R-486-53 engine it is expensive, some time consuming, subjects thermal shock caused by fuel injection.

***Cracked Cases.** KLM complained that Champion plugs will keep on firing at low and medium power—power at which magnets crackle as a rule when the case base ceramic is cracked. Disrupting progression can result because loose pieces of ceramic cannot dissipate heat adequately and become superheated. Since the plugs keep on firing, they cannot be picked up on a mag check.

***Plug Removal.** Here are the instructions on spark plug burn out procedures by the two remaining engine manufacturers.

P&W. Burn-out results can be beneficial. Being engine manufacturers prone to feel bettering, however, for optimum burn-out results. Nothing is gained by using higher manifold pressure. P&W cannot attribute valve or piston failures to the procedure.

W&J. It is also pre-burn-out and like-wise warn against using too high power with the procedure. Suggest running engine at 1,000 rpm, leaning out to best power and allowing engine to run a few minutes under those conditions.

Continued Air Lines found a definite correlation between engine troubles and spark plug troubles. "You don't have plug problems with a good engine."

TWA on the other hand, found a straight line relationship between engine time and spark plug removal rates. For the first 200 hr. of engine operation it has no plug removal to speak of. Plug removal rate increases steadily with engine life. TWA, however, that removal conditions of the engine caused this progressive increase in plug removal rate.

British European Airways reportedly use a Swiss instrument to record engine oil pressure, rpm and altitude of its aircraft. Among other benefits, the records show whether cases follow prescribed procedures.

(This is the first of two reports on the Aircraft Ignition and Spark Plug Conference. The conclusion will appear next week.)

CAA Certificates French Overhaul Base

As an agency certificate has been awarded Air France's Goussier overhaul base, near Paris, by the Civil Aeronautics Administration.

As a result, the plant may operate as an approved aircraft engine repair station and overhaul American engines with full CAA approval for the finished product.

Air France says it already has given assistance to Trans World Airlines.

AEROTEC AUTOMATIC CONTROLS



Prove dependable in combat and transport operations



An Aerotec Dual Road Switch Top Mounted

Republic, Boeing, and other leading aircraft manufacturers are using many types of Aerotec Automatic Controls in increasing numbers. These controls are custom designed and built to meet specific problems of high speed and high altitude flight in today's aircraft. Each Aerotec automatic device meets exacting requirements for reliability and performance efficiency under all conditions.

The picture shown above are typical devices that incorporate Aerotec Automatic Controls. The Republic P-47 Thunderbolt, a combat power aircraft, uses Aerotec pressure switches and a new dual road switch suitable for engine oil pressure, auxiliary fuel tanks. Boeing has used Aerotec valves, float switches, and pressure switches on their transport planes.

When you are faced with problems of automatic controls for ships, landing gear and engine heater applications, fuel transfer, flow indication, etc., contact Aerotec. One of our experienced specialists is near you, ready to give prompt and able assistance at any time. Call or write.

... for AEROTEC controls custom-built to your needs contact THERMIX

AIRCRAFT REPRESENTATIVES
CLEVELAND 24 OHIO
NEW YORK 17 NEW YORK
LOS ANGELES 17 CALIF.
SAN FRANCISCO 17 CALIF.
PHOENIX 17 ARIZ.
DENVER 17 COLO.
PORTLAND 17 ORE.
SEATTLE 17 WASH.
TACOMA 17 WASH.
VANCOUVER 17 BRIT. C.
VICTORIA 17 BRIT. C.
WHEATRIE 17 ALA.
BIRMINGHAM 17 ALA.
MEMPHIS 17 TENN.
NASHVILLE 17 TENN.
KANSAS CITY 17 MO.
ST. LOUIS 17 MO.
CHICAGO 17 ILL.
INDIANAPOLIS 17 IND.
CINCINNATI 17 OHIO
COLUMBUS 17 OHIO
DAYTON 17 OHIO
DETROIT 17 MICH.
MILWAUKEE 17 WIS.
MINNEAPOLIS 17 MINN.
ST. PAUL 17 MINN.
SPRINGFIELD 17 ILL.
TOPEKA 17 KAN.
WICHITA 17 KAN.
OMAHA 17 NEB.
LINCOLN 17 NEB.
SIOUX FALLS 17 S.D.
RAPID CITY 17 S.D.
BISMARCK 17 N.D.
FARGO 17 N.D.
GRAND RAPIDS 17 MICH.
LANSING 17 MICH.
FLINT 17 MICH.
TOLSON 17 MICH.
ANN ARBOR 17 MICH.
Kalamazoo 17 MICH.
East Lansing 17 MICH.
Farmington 17 N.H.
Manchester 17 N.H.
Nashua 17 N.H.
Rochester 17 N.H.
Concord 17 N.H.
Keene 17 N.H.
Dartmouth 17 N.H.
Durham 17 N.H.
Greenville 17 S.C.
Spartanburg 17 S.C.
Greenville 17 S.C.
Spartanburg 17 S.C.
Greenville 17 S.C.
Spartanburg 17 S.C.

THE THERMIX CORPORATION
GREENWICH CONNECTICUT
Greenwich 15 E. C. GREENWICH 15 E.
Greenwich 15 E. C. GREENWICH 15 E.

THE AEROTEC CORPORATION

AIRCRAFT DIVISION
Greenwich 15 E. C. GREENWICH 15 E.
Greenwich 15 E. C. GREENWICH 15 E.

Designers and Manufacturers of Automatic Controls—Valves, Handing, Relief and Check Types—Pressure Switches, Gauges, Alarms, Differential and Absolute Types—Float Switches, Trip, Indicator and Alarm—Single, Dual, or Triple

D-C Control Headquarters at your fingertips...

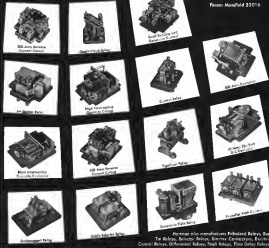
Aviation's phenomenal strides, coupled with the growing complexity of aircraft systems and components, have created a whole new set of problems in D-C electrical control. That's why today's avionics and accessory manufacturers are turning to Hartman's D-C Control Headquarters—for solutions to these specialized problems.

If you are faced with a problem involving D-C control, turn it over to Hartman where it will be analyzed and engineered with an efficiency that comes from nearly half a century of specialization. And D-C Control Headquarters is as near as your telephone.

the Hartman Electrical Mfg. Co.

"D-C CONTROL HEADQUARTERS"
MANSFIELD, OHIO

Phone: Mansfield 33015



NEW AVIATION PRODUCTS



20G Avionic Relay

Recent addition to the avionic relay catalog is a balanced structure developed for aircraft by the Avionics Electric Co.

Custom-built to specific requirements, the relay is designed to withstand shocks and vibrations up to 20G while holding contacts open or closed as required. According to the firm, the structure is balanced so the pivoted fulcrum on which it rests in a manner that shock or vibration in any direction cannot affect it.

As an example of operation, the relay, used as a 22 1/2V, d.c. potentiometer control under severe vibration described above, will pull in and close contacts with a maximum current draw of 0.055 amp. and hold them closed with a draw of only 0.005 amp. Contacts are rated for a current of 5 amp. at 110V, a.c., 60 Hz. Relay is a single pole, single throw (with double break) type and weighs 71 oz.

Avionics Electric Co., Inc., 14-28 49th St., Long Island City 1, N. Y.

and shock encountered in military planes and ships applicable Air Force and Navy specifications, the company says.

Performance features listed by the firm include a frequency range up to 11,000 mc./sec., insertion loss under 5 decibels throughout operating range and power handling capabilities equal to exposed type N components. The switch can be driven by a motor operating on 24-250 v. d.c.

Transco Products, Inc., 12210 Normandie Ave., Los Angeles 5.



Plane Engine Control

A self-contained hydraulic engine control, reportedly used in British aircraft, but so far not in U. S. planes, is being marketed in this country by Sperry Products, Inc.

Sperry manufactures the control under license from the English firm, Director, Ltd. It consists essentially of a low-pressure transmitter (lever-operated piston spring assembly) and a receiver controlled by a single tube. Hydraulic oil is sealed in the system and any movement of the transmitter handle is precisely duplicated by the receiver lever. Opposing springs of equal force in the master and slave units "balance" the control and virtually eliminate lost motion and backlash, Sperry says.

The lightweight system has possible application in aircraft throttle control, poppet valves, etc. Sperry claims it is the only single tube, balanced, self-contained hydraulic master control now available. Among virtues of the control listed by the firm are maximum backlash free motion and ease of installation. Sharp bends can be made in the tubing, without affecting operation, says the firm.

A complete system, weighing about 7 lb., has a maximum rated capacity of

PIASECKI

The Fastest Growing Co. In The Industry

**Needs
DRAFTSMEN
and
ENGINEERS**

With
Aircraft Experience
On

- AIRFRAMES
- CONTROLS
- ELECTRICAL INSTALLATION
- POWER PLANT INSTALLATION

Also
**Stress, Weight
and Vibration
Engineers**

Position Pay for Oversee. Eval. See Company Details. Full Vacation & Bonuses. Best Opportunity to Advance With a Leader in the Rapidly Expanding Helicopter Industry.

Write: Chief Detail Bureau of Experience & Education to: Dept. Manager Personnel Manager.

**PIASECKI
HELICOPTER CORP.**
Merrill, Pa.

A Philadelphia Suburb
NEAR SWARTHMORE

Airborne Radar Unit

Micro-driven control switches for use with radar equipment in aircraft are being marketed by Transco Products, Inc.

Among various models available for military applications is the compact, single pole, four-position switch shown. This unit, No. 1486-A, is ruggedly built to withstand extreme temperature

NEW TINNEMAN HARNESS CLAMP with Safe Interlocking Tongue and Slot



A-303M

Just show how correct tongue fits in drive clamp and release without pressure is applied to disengage after use and clamp is self-closed with one motion.

CAN'T SPRING OPEN ACCIDENTALLY... YET OPENS EASILY FOR SERVICING!

Here's the most efficient answer to the old quick-opening type of harness clamp! Aircraft designers and engineers will welcome the advantages offered by the new A301A Tinnerman clamp. Check this list...

1. High velocity foot-candle limit over 500 ft/c.
2. Can be preassembled to wire bundle before fastening to structure.
3. Opens and closes by hand—no tools required.
4. Light weight—yet strong.
5. Used with synthetic rubber for wire protection and insulation.
6. Range of 15 sizes—from 3/8" diameter to 1 1/2" diameter handle.

Write today for additional specifications.
Tinnerman Products, Inc., Dept. 12, Box 6688, Cleveland 1, Ohio.
Distributors: Air Associates, Inc., Teaneck, New Jersey.

TINNEMAN
Speed Nuts®

FASTEST THING IN FASTENINGS®

400 in. lb. on the present stroke and 125 in. lb. on the return. Smaller cone tools are available which do not exceed 10 in. lb. on the present stroke or 15 in. lb. on the return.
Spartan Products, Inc., Danbury, Conn.



Climate Study Aid

A portable electronic climate survey system, designed for field aerodynamic studies at airports, in rocket and guided missile research and for other climate investigations, has been placed on the market by Benson & Whitley, Inc. The system is self-contained (powered by batteries) and combines "drag-free" accelerometer characteristics and electronic data-gathering techniques to provide accurate recordings of wind direction and wind speed. Accelerometer speed ranges are 0 to 10 and 0 to 10 mph. The entire installation weighs 185 lb. with batteries.
Benson & Whitley, Inc., 905 San Carlos Ave., San Carlos, Calif.

ALSO ON THE MARKET

Cold storage used in instruments and other components strongly resist effects of moisture, rusting and chemical action when protected by a tough, thin coating which remains flexible down to -70F and won't break down at temperatures up to 150 F, says a developer, Robert Hoffmeyer, Congress Fuel and Electric Co., Daytona Beach, Fla.

Fiber, simpler measurement of cam centers, both in angle and amount of eccentricity, is made possible by using the new Optical Cam Rise Gauge which also reduces chances of error, says maker, F. T. Crivello Mfg. Co., Wayne, Pa.

Vertical rolling head with accelerometer provision for angle bearing and rolling or horizontal rolling machines is announced by a California firm. A vertical spindle with front of 14 in. to 3 in. has a counterweight fixed calibrated in 500 in. increments. Cam rising is 18 to 15 in., moving in oil. Twenty five models are available from Brown M&E Tool Co., 5441 San Fernando Road West, Los Angeles.

Cherry Rivet
Company

Lock Bolts

combine the advantages of
bolts and rivets...
increase strength...save instal-
lation time...save 50% in weight
assure hi-clinch

Cherry Rivet Company Lock Bolts are high strength, structural fasteners specifically designed to lower overall costs. One man installs them with a special pneumatic tool. Installation time is less than 1/2 that of conventional bolts and nuts and similar high strength fasteners.

Installed Lock Bolts are 50% lighter in weight than equivalent AN bolts. Their tensile strength is equal to that of the same sized AN bolt, yet their shear strength is considerably greater. On installation, the Lock Bolt clamps the material being fastened tightly together, and accurately clamps it under tension. The clamping action is sufficient to pull together a gap between sheets of as much as 1/4".

Combining high strength, light weight and rapid installation, Cherry Rivet Company Lock Bolts offer every production advantage you may apply in your business. For complete information write today.

Lock Bolt
Availability

Standard T301 and 202 Aluminum Alloy
Fast Tensile Alloy Steel: 4140 Steel
Diameters: 3/16", 1/4", 5/16", 3/8", 1/2"
Hex lengths: 1/8" to 1 1/2"
Round Heads: For "100" Flat, Round Heads,
90° Flank

Cherry Rivet
COMPANY
A Division of Townsend Company

Here's how Lock Bolts work



Lock bolts consist of two members, a pin and a collar. The pin is inserted from one side of work; the other clipped ends pin from opposite side. Pneumatic instructions tool is then applied to clamp end of pin.

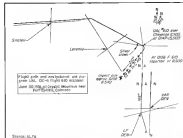
Clamping serrated grooves in sheet and tool inserts in pulling action on pin while air mechanism is pushing collar against material. This seals and clamps materials tightly together. Tool engages collar into pin groove, breaks pin back with collar.

Write for
free
information
today

CHERRY RIVET COMPANY
Department 9-111
220 Windsor Road
Los Angeles 15, Calif.

Please send me free of charge your data sheet on Cherry Lock Bolts.

Name _____
Street _____
Company _____
City _____ State _____



ALPA MAP shows UAL's DC-6 which crashed into Crystal Mountain, near Ft. Collins, Colo., June 18, was flying 210 deg. heading instead of prescribed 165 deg. after passing over Cheyenne enroute to Denver.

less function. Pilot's ADF was tuned to Newark marker. Captain's ADF was on Haystack marker and at time of crash it indicated phase leaded direct toward Haystack.

Investigators have found no signs of instrument, radio, engine or airframe trouble prior to impact. Ground radio aids were found to be functioning normally.

The track of the plane in the control room has been estimated with reasonable accuracy. (See map p. 63) Ground line at estimated track, said line is ground was recalled track, not exact but approximate.

Weather at Oakland had been reported as 1,400-ft. overcast with 10 mi. visibility. The C-46 later reported weather clear and estimated above cloud tops near 2,000 ft.

► **Course Down**—Main heading gear of the DC-6B was down. None actual was partly as all down, it is believed.

Pilot had a total of 12,073 ft. flight time, of which 816 ft. were instrument flight time. He had 415 ft. in the DC-6 and 14 ft. in the DC-6B. Cockpit and flight characteristics of the DC-6B are nearly identical with those of the DC-6A.

Pilot had no instrument check flight in the Oakland area on June 11. He had flown in the Oakland and San Francisco area since 1939 and had taken many instrument check flights there. He was familiar with the Newark marker and approach.

The approach controller said at the hearing that he could not remember any pilot ever having made an instrument approach turn where that one did

—to the northeast of the Newark marker.

► **Course Analysis**—The theory of pilot investigation is that the pilot, reported to pass over Newark marker on his last pass at 15,000 ft., descended rapidly, he made visual contact somewhere near the town of Newark, located just off the approach leg. He saw the town of Newark and thought it was Newark, the theory goes.

He therefore made a procedural using instrument Niles and reported "over Newark, inbound." He let on a heading of about 207 deg. respectively, flying almost parallel to the inbound beam heading of 184.

It was concluded possible that the pilot decided the cockpit's ADF was tuned to Oakland marker instead of still on Haystack marker. The cockpit's ADF needle was indicating station about straight ahead when plane hit.

Crystal Mountain Crash

At 8:04 pm on June 18, 1951, United Air Lines DC-6B flight 610 from San Francisco reported over Rock Springs, Wyo., flying at 15,000 ft. over the Rockies. The announcements below were heard by check (about 15,000 ft. down to about 11,500).

Pilot estimated arrival over Denver at 2:07. Later he reported over Silver Creek (his marker 1) he went off Cheyenne and requested a lower altitude about 15,000.

Denver traffic control cleared him to descend to 15,000 ft. after passing Cheyenne. Pilot reported at 1:47 over Cheyenne at 15,000 ft. Denver gave

him the latest altimeter setting and he started descending heading into Denver, estimated only 25 min. south.

Nine min. later the pilot reported leveling out at 15,000 ft.

Less than four min. after leveling out at 15,000 ft. the plane struck Crystal Mountain. There was believed to have been no heading 205 deg., although course to Denver was 165 deg. It hit at altitude 15,400 ft. All 50 persons aboard were killed.

► **Findings**—Three down Cheyenne to impact site was about 11 min. Pilots apparently knew they were flying a course of 295-310 degrees. (The two last gas cockpit were found reflecting 310, the magnetic compass and old rectangular gyro at 210 and the cockpit's dual indicator compass scale was jammed at about 202.)

On the captain's radio radio (see) the following: down Cheyenne to impact site (VAD) was found set up on the VHF screen. Range switch was turned lead enough in the receiver to be heard by the captain. The low frequency ADF was turned to Denver low frequency station, but the range altimeter was off and the voice selector was on.

If the pilot was listening to the communication of receiver he would have the state from the low frequency and course signals from the high frequency range.

Not enough attention of the cockpit's audio selector panel to make a complete analysis of his radio setup.

Pilot check showed that navigational aids in the area were operating normally.

All evidence indicates the airplane was apparently in every respect at time of crash.

In the 11 min. since leaving Cheyenne range station, the pilot had traveled 52 miles on a heading about 45 deg. off to right of his proper course. ALPA investigation questioned from fact and other evidence that cause of the crash could only have been "that some navigational problem was not correctly solved."

► **Navigational Facilities**—Then pilot investigation undertook a study of the local navigation aids to see if they could have misled the pilot. They found a potentially dangerous combination of navigational aids at the approach of the two Denver ranges (see map).

► **Both ranges** have parallel north legs. Heading south on the north leg of the low frequency range the pilot has the "N" on his right and "A" on his left. On the high-frequency range he has the "A" on his right and "N" on his left.

► **Possible Cause of Crash**—So, the Air Line Pilot, investigating, remarks "it would therefore be possible for a pilot listening to the low frequency range

and believing he was listening to the low frequency range to make a 45 deg. cut at the 165 deg. north leg, making his heading approximately 210 in an attempt to get on to the low frequency north leg of DEN (Denver range). It was pointed out, however, that if a pilot were listening to the high frequency range he would get an "A" signal on a standard quadrant and would not get over to an "N."

If the voice switch in the low frequency range were turned on the pilot would have the state connected with the low frequency range and believe that he was listening to a low frequency range. Since, in this case, the pilot had a 16-mph indicated air to Cheyenne, he reasonably could believe that he would have a similar ground speed on the way into Denver, pilots said.

He could believe that a constant would keep him away from the range leg a little longer than normally (i.e., the 11 min. to the impact).

ALPA report adds: "The captain had only 65 hr. and 32 min. on the line in DC-6B equipment although he checked out in April, 1951."

"Although the captain had sufficient time to complete 100 hr. in DC-6B, he did not. In the interim period he had gone through DC-4 school and was flying a DC-3 schedule while awaiting his 100 hr. four-engine certification flight time in both DC-4 and DC-6B."

Centerline Runway Lighting Is Approved

Lighting Is Approved

A majority of the world's experts on runway approach lighting have at last agreed upon the centerline system of lighting.

They came to unofficial majority agreement after two weeks' comparative study and discussion in Washington and New York (JANUARY WEEK Oct. 5, p. 16). Representatives of seven governments in attendance. Civil Aviation Organization officially were only observing comparative demonstrations and study data presented.

But technical delegates to International Airport Assoc. decided in New York last week on a firm recommendation of the association's action to ICAO. ICAO will meet next year to consider adopting it as standard approach lighting for the world's airports.

► **Both Standard**—British's foremost expert on approach lighting development, A. G. Calvert, already has drafted much of his study of approach lighting and is now working on a new and growing problem.

To make a safe final flare-out and landing in bad weather, a pilot must see a minimum of 17 mm-a-h light on each side ahead of him, and preferably more, says Calvert. And that is cutting



One is a counterfeit...

... The *aviation* grain flow in the VOI-SHAN forged bolt, at the right, tells the story. The metal flow lines follow the contour like the grain around a knot... and everybody knows a knot is the toughest part of a board. Because they are forged, not cut—V-S fasteners can be said to have "built-in knots"—strength ingrained for their specialized job... none will ever show up as "counterfeit" for full strength in an airplane. This is a fact you can depend upon, insured by rigid checking throughout production against any possible failure.

May we send you a copy of the VOI-SHAN brochure on V-S Control Checks for "Vital Security"?

VOI-SHAN MANUFACTURING CO., INC.
3401 REGINA STREET, CULVER CITY,
CALIFORNIA • PHONE TEXAS 5-1511

VERIFIED STRENGTH BOLTS FOR

Vital Security



CURTIS-WRIGHT CORPORATION

PROPELLER DIVISION

...offers Long-Term
Career Opportunities
for Experienced

DESIGN ENGINEERS and Recent ENGINEERING GRADUATES

Aeronautical, mechanical, electrical and metallurgical engineers combine their efforts to form the teams responsible for the creative engineering necessary to produce Curtiss-Wright's distinctive and turbojet-propelled

Aerobatic training of the junior engineers combined with the technical knowledge and experience of the senior engineers are merged to form a well balanced engineering organization.

The forgings, castings, cuts, grinds, hydraulic and electrical mechanisms comprising a propeller provide a diversity of problems so that the engineer finds ample opportunity to continue the development of his skill.

Activities in engineering cover:

1. NEW SOLUTIONS TO DESIGN PROBLEMS. Current designs and development of Modernization and a Departure from Current Design.
2. DEVELOPMENTS IN EXISTING DESIGNS. Modifications in Current Design to meet Changing Service Requirements and Increase the Life of the Product.
3. THEORETICAL ANALYSES. Advanced studies in the field of Aerodynamics and Experimental Stress Analysis are Applied to Propellers being prepared for Advanced Models of Airframe.

PLANT LOCATIONS:—Northvale New Jersey, 25 miles west of N. Y. C.—on State Highway 6 Employees live in pleasant residential homes within radius of two miles from plant. Nearby colleges offer graduate night courses for employees wishing to continue academic work.

Send a resume to J. H. Long, Adjunctive-Gen. Engineer, AEP-10, Propeller Division, Curtiss-Wright Corporation, Caldwell, N. J.

AC SPARK PLUG DIVISION of GENERAL MOTORS CORPORATION PRECISION INSTRUMENT PLANT

Positions now available for highest caliber personnel in the field of industrial automatic, electronic, chemical control equipment.

**MECHANICAL DESIGN ENGINEERS
ELECTRICAL ENGINEERS
SERVO ENGINEERS
RADIO ENGINEERS**

Now and expanding demand of an established firm with 20 years of successful experience in the instrument field. Work varied daily with the manufacturing and development of highly complex equipment of the most advanced type.

Write or Apply
**AC Spark Plug Division
GENERAL MOTORS CORPORATION
1925 E. Michigan Place
Milwaukee 3, Wisconsin**

Outstanding Opportunities Now Available at BELL AIRCRAFT CORPORATION

Planner Helicopter
Manufacturers
Ft.

- Instrumentation Engineers
- Flight Test Analysts
- Mechanical Test Laboratory Engineers
- Weight Engineers
- Power Plant Engineers
- Transmission Engineers
- Basic Engineers

Interesting and challenging work in a large scale helicopter development and production program. Personnel will receive no previous training.

Send complete resume to
**Manager, Engineering Personnel
BELL AIRCRAFT CORPORATION
Helicopter Division
P. O. Box 1, Buffalo 3, N. Y.**
All resumes will be held in strict confidence.

STRESS ANALYST AND LAYOUT ENGINEERS

or others about understanding in metal fabrication required.

**ANDERSON, GREENWOOD & CO.
AERONAUTICAL ENGINEERS, BOSTON 12, MASS.**

WANTED— CHIEF ENGINEER

by looking oneself into this position. Applicant must have had successful experience in production, design and development of aircraft engine mechanical and electrical equipment as well as experience in operation of large unit.

Position will be supported by excellent staff of men working in their individual fields. Give complete resume of experience including past salaries, names of churches, papers and salary desired.

Our employees are aware that we are seeking a candidate without our reservation.

Salary will be commensurate with responsibility. All replies will be held in strict confidence.

Write: **WILLIAM ANDERSON
330 N. Michigan Ave., Chicago 11, Ill.**

RESEARCH ENGINEERS

Positions available for "AERONAUTICAL" and "MECHANICAL" engineers who have past design and synthesis for research project work—both analytical and experimental. Opportunities exist for research in the fields of aerodynamics, thermodynamics and air plasma engine system analysis. Including dynamic and structural stress research and design and computer research. Employees high speed wind tunnel, burner research and gas dynamic facilities available in the research engineer, need resume of your qualifications.

RESEARCH DEPARTMENT UNITED AIRCRAFT CORPORATION 400 S. Main Street East Norford, Connecticut

"AIRLINE RAMP OPERATIONS"

Search for Sales Public Relations and Civil Control Engineers. Prefer full scale. Forward stamped California Eastern Airways. Contact: American Airlines, San Francisco.

MECHANICAL STRESS ANALYSTS

Unusual opportunities for important analytical work as HELICOPTER transmission systems.

ALSO
many openings for qualified
Mechanical & Structural
DESIGNERS
DRAFTSMEN
CHECKERS
LOFTSMEN

Send detailed resume to
Personnel Manager
**KAMAN AIRCRAFT CORP.
WINDSOR LOCKS, CONN.**

PROJECT ENGINEERS

STRATOS
DIVISION

**HANCOCK ENGINE & AIRCRAFT CORP.
Farmingdale, Long Island, N. Y.**

Requires a senior development engineer for their Stratost Division. Should have an extensive development and test experience in the gas turbine or related field.

Extensive traveling work with earth designers and builders. Including gas turbine, for the development of aircraft engine systems and related to other military & civilian aircraft.

Applicants should have a first class technical and practical background in thermodynamics, fluid mechanics and heat transfer with a detailed experience in development work.

Now start under consideration, in locally located on the north shore of Long Island.

Apply in writing to the Personnel Department enclosing a resume of your previous experience.

Box 200 5400 251 W. 44 Street, N. Y.

ENGINEERS



Good Year Aircraft Corporation, one of the oldest aircraft development organizations in the field, now offers general opportunities in engineering, both experienced and entry level positions, in all branches of aircraft design and development.

In addition to manufacturing airplanes and rockets, Good Year Aircraft builds a number of vital aircraft components as well as engine sections, wings and other material for the defense program. The diversification of products beyond purely defense work, at Good Year Aircraft, has resulted in an increasing variety and increasing complexity throughout your work.

Excellent problems with accompanying Good Year benefits and bonus for extended work week are open to

**AERONAUTICAL
MECHANICAL
CIVIL
ENGINEERS**

**ELECTRICAL
ELECTRONICS
INDUSTRIAL**

for
DESIGN AND DEVELOPMENT

**AIR FRAME STRUCTURE LANDING GEAR AND
HYDRAULICS
EQUIPMENT AND POWER PLANT INSTALLATIONS
ELECTRONIC AND ELECTRICAL SYSTEMS
WHEELS AND BRAKES MECHANICAL COMPONENTS**

Personnel are needed in the following classifications:

**DESIGNERS
PHYSICISTS
DEVELOPMENT ENGINEERS
STRESS AND WEIGHT ANALYSTS**

**DRAFTSMEN
MATHEMATICIANS
TOLL ENGINEERS**

Previous experience and formal education desirable. However, candidates without formal education but with equivalent practical experience in relevant engineering fields will be given consideration.

You are invited to investigate these opportunities by submitting a resume of your qualifications and experience or by simply sending for an information folder of which will be given prompt and careful consideration.

Address all correspondence to
Mr. C. G. Jones, Salary Personnel Department

**GOOD YEAR
AIRCRAFT CORPORATION**
AERON 15, OHIO

ENGINEERING OPPORTUNITIES

- PROJECT ENGINEER
- AND INSTRUMENTS
- STANDARDS AND PROCESSING ENGINEER
- ELECTRO-MECHANICAL DESIGNERS
- ELECTRONIC DESIGNER
- SERVICE ENGINEERS
- METALLURGIST
- TECHNICAL WRITERS

Permanent positions offering excellent professional opportunities with leading aircraft accessories manufacturer.

Pay for M.E. or E.E. graduates with minimum or 2-3 years experience in aircraft industry or related field.

Salaries commensurate with ability.

Interviews of company expense with qualified applicants. Send resume to:

Personnel Manager

LEAR, INCORPORATED

110 Isaac, N. W.
Grand Rapids, Michigan

BELL AIRCRAFT CORPORATION

Pioneer Helicopters
Manufacturers

Office

Immediate Opportunity for Qualified Aircraft Personnel

- CHIEF OF LABORATORY
- MATERIALS AND PROCESS LABORATORY ENGINEERS
- METALLURGIST

Long career helicopter development and production program, many excellent opportunities for advancement and experience.

Send complete resume to:
Manager, Engineering Personnel

BELL AIRCRAFT CORPORATION

Helicopter Division

P. O. Box 1, Buffalo, N. Y.

All replies will be held in strict confidence.

MARQUARDT AIRCRAFT CO.

Is engaged in the development of subsonic and supersonic rocket engines and related control and accessory equipment. Our production line is running out rocket engines under government contracts.

IMMEDIATE OPPORTUNITIES ARE AVAILABLE FOR EXPERIENCED:

- Aircraft Structures Design Engineers
- Fluid Control Design and Development Engineers
- Test Facility Design Engineers
- Construction Development Engineers
- Instrumentation Engineers

APPLY:

PERSONNEL DEPARTMENT
1001 Newmarket Ave. Van Nuys, Calif.

RESEARCH OPPORTUNITIES

Opportunities in the field of design of aircraft structures, systems, and accessories. In MAYNARD, MASSACHUSETTS. FOR MORE INFORMATION, contact Mr. J. W. Maynard, 1001 Newmarket Ave., Van Nuys, California.

EXPERIENCED and MANAGERIAL level positions in the design of aircraft structures, systems, and accessories. In MAYNARD, MASSACHUSETTS. For more information, contact Mr. J. W. Maynard, 1001 Newmarket Ave., Van Nuys, California.

Engineers are offered the opportunity to contribute to the development of aircraft structures, systems, and accessories. In MAYNARD, MASSACHUSETTS. For more information, contact Mr. J. W. Maynard, 1001 Newmarket Ave., Van Nuys, California.

Personnel Office

UNIVERSITY OF MICHIGAN
Ann Arbor, Michigan

FLIGHT TEST ENGINEERS

Excellent opportunities immediately available for qualified Flight Test Engineers and Flight Test Engineers.

Write Employment Manager

FAIRCHILD AIRCRAFT
KANSAS CITY, MISSOURI

PROJECT ENGINEER

To take charge of research project in Aero Space Dept. of the UNIVERSITY OF MICHIGAN. Must have M.S. in Aero Space (Ph.D. preferred) and a minimum of 3 years experience. Excellent opportunity for advancement in doing flight test work. Working conditions. Liberal employee benefits. Salary details of background in the Research Institute, Aero Dept., University of Michigan, Ann Arbor, Michigan.

ENGINEERING SPECIALISTS

OPPORTUNITY TO BECOME ASSOCIATED WITH THE DESIGN OF THE WORLD'S LARGEST HYPERSONIC TEST FACILITY.

Traditions in Operational Power Available for Senior Design.

IMMEDIATE POSITIONS AVAILABLE FOR AEROSPACE ENGINEERS ON HYPERSONIC WIND TUNNELS, RACE-CAR, GROUND OR TRANSDUCERS, SUPER-SOUND OR HYPERSONIC.

Positions Also Available for Mechanical, Electrical, Structural, and Instrumentation Engineers.

SVERDRUP & PARCEL, INC.

Consulting Engineers

Established 1920
905 Olive Street
St. Louis 1, Missouri

WANTED ADVERTISING MANAGER

FOR AIRCRAFT RADIO MANUFACTURER

An international leader in the field of aircraft radio equipment, we are seeking an experienced and creative advertising manager to develop and execute a comprehensive advertising program for our products. The successful candidate will be responsible for all aspects of our advertising efforts, including media selection, copywriting, and distribution. We offer a competitive salary and excellent benefits. If you are interested, please send your resume and references to: Mr. J. W. Maynard, 1001 Newmarket Ave., Van Nuys, California.

Mr. J. W. Maynard
1001 Newmarket Ave.
Van Nuys, California

Attractive Opportunity for Engineering Experimental Test Pilots

WANTED: ONE FOR JET FIGHTERS ONE FOR HELICOPTERS

... with recently increased production and development contracts at hand, McDONNELL AIRCRAFT CORPORATION now offers extensive opportunities for two young, qualified engineering experimental test pilots. Interesting and challenging work.

Qualifications: Applicants must be graduate engineers (aeronautical preferred) capable of conducting engineering test flights in jet airplanes or helicopters. ... fighter pilots must have approximately 1,000 hours of flight time, some jet ... and helicopter pilots must have military helicopter time and have attended service helicopter test pilot schools.

- TOP STARTING SALARIES
- LIBERAL BONUSES
- EXCELLENT HEALTH, RETIREMENT, SECURITY PROGRAMS PROVIDED

McDONNELL Aircraft Corporation
Manufacturers of AIRPLANES AND HELICOPTERS • ST. LOUIS 2, MO.



VARIETY
OFFERS THE USE OF
ENGINEERS
WORKING WITH
Martin

Needed Now!
Structures Engineers
Aero-dynamics Engineers
Electro-Mechanical Engineers
Power Plant Engineers

Manufacturing the greatest diversity of aircraft in the world, Martin Aircraft Corporation is seeking experienced engineers to work on a wide variety of aircraft. The successful candidate will be responsible for all aspects of the engineering process, including design, development, and production. We offer a competitive salary and excellent benefits. If you are interested, please send your resume and references to: Mr. J. W. Maynard, 1001 Newmarket Ave., Van Nuys, California.

CHIEF PROJECT ENGINEER And CHIEF TEST ENGINEER

To work with a small select group of Engineers on various projects and assignments.

CHIEF PROJECT ENGINEER to be in complete charge of Engineering Department and oversee basic design of aircraft, test, systems, hydraulic, and other systems. Capable of supervising the Chief Engineer.

CHIEF TEST ENGINEER to be in complete charge of Experimental Test Laboratory, equipment testing, wind tunnel reports, etc. Prior experience in the aircraft field is essential. Must be experienced graduate level and have extensive experience. Submit personal history including education, work experience, and references to our Assistant Chief Engineer. No use in confidence.

LEAR, INCORPORATED
Rome Division, Troy, Ohio Phone 1271

FOR SALE USED AIRCRAFT

LANDSIAIR
EXECUTIVE AMPHIBIAN

Excellent 1974
1974 1974
1974 1974
1974 1974

BECKCRAFT
1974 1974

1974 1974
1974 1974
1974 1974

GRUMMAN GOOSE
1974 1974

1974 1974
1974 1974
1974 1974

SOUTHERN CALIFORNIA AIRCRAFT CORPORATION
Box 247, Oceanside, California

LOCKHEED 12A

A fine executive aircraft, beautifully finished, with complete maintenance, excellent with safety, speed, range and value. \$100,000. Call for details.

ALCO WATTS, INC.
Cleveland, Ohio

To Sub. Mark A. 2013.

Cleveland, O.

Thought you'd want a short FBI on the suspicious party HOGG put on here at the Lewis Lab. They had more than 1500 visitors, mostly scientists & military, and a few press. In addition, we already ran our own media coverage story from the place. I think the FBI should know that the party was a fine old show-biz affair. I think the FBI should know that the party was in the home quite a bit on specific facts. Maybe another product of HOGG's confounding roadshow on security. But now we got the idea that it was more a demonstration of "HOGG MEETING THOSE BUNCHES OFF" than a release of "POWER IN MIND WE HAVE POWER OFF." It was time well spent.

If you remember the old theory that research is about three years ahead of present-day stuff, there's a lot of progress ahead in the next three years. The OEM's are concerned most about new jets and rockets in their advanced thinking now. The big developments are in the engine area, and about some quick solutions to turbojet shortages problems. Much ideas are coming the blades and the *off* flow, and using less strategic metals that have been hard-to-get, and using ceramics are being offered to the engine industry as production-ready solutions.

The real, long-haired antihits here don't pay much attention anymore to the transonic speed range. It's just something you go through as you gain your cruising speed.

They showed us a 16-inch diameter manjet in the new # 6 by 6 ft, square wind tunnel, and their altitude test facilities in spite of looking mighty up to 24 3/4 in. diameter, at 1000 ft. to 2500 ft. altitudes of about 7000 ft. altitudes simulated up to 60,000 ft. It looks like the 35 in. diameter manjet was the last one for the immediate future, but a few much larger the manjet for the immediate future, it's a safe bet that we are going to see a lot of manjets on the tips of some really big copper cones, as well as in altitudes, and the projects seem to have a little more future as airplanes powerplants than I had previously expected.

From the way some talk out here, it looks like the next major step in procurement will be contracting with a super-sounds company combined with a very efficient afterburner. This combination will enable any airplane to get up to velocities fast enough so that the major effect of the afterburner with its tremendous added thrust can be cut in at speeds where it will be much more efficient than it is at subsonic velocities. Operating speeds up to 1500 mph, at least, appear to be in the cards for planes powered like this.

Incidentally, it was amusing to see a big silhouette drawing of a plane powered by Turbjet with afterburner, is a demonstration of afterburner future prospects. Nobody said so, but it looked very much like the installation of the new Westinghouse J-40 in the new Navy McDonnell RFM RFM Phantom carrier fighter. Oh, yes; I got to handle the throttle feeding gas to the 16 inlets in the wind-tunnel...An NACA-accredited jet operator now!

Allow Mother's Two

**Can
you
write?**

Can you write knowingly and accurately about the newest developments in aviation electronics? Both military and commercial!

Want to work in New York? In a centrally located, modern office building? With a congenial group of leading aviation specialists? For one of America's best-known companies?

If so, write us (completely, please) your experience and educational background, and your salary requirements. Your letter will be answered; and, if you say so, we will keep it confidential. If you send us any material that you want retained, please say so in your letter and enclose a self-addressed envelope. Don't bother about the postage. We will simply be storing

This is ~~not~~ a tech manual writing job.

Write Chief Editor: F3323
c/o Aviation Week
339 West 42nd St.
New York 18, N. Y.

ADVERTISERS IN THIS ISSUE

AVIATION WEEK—OCTOBER 29, 1951

important in packaging?

STRETCH...



Specify
NYLCO
Strength-Stretch
Barrier Materials

Write today for free switch
and specification book #419



**NYLCO
PRODUCTS INC.**
120 Main St., Chicago, Ill.

Represented internally by loading
inclusion systems

PRODUCTION ITEMS AND
TECHNICAL SERVICE FOR **aviation**
parts and supplies

**AN
HARDWARE**
We carry a balanced
stock. Send us your
requirements.

**PARKER VALVES,
FITTINGS and
"O" RINGS**
Also compounds and
tube fabrication tools

AN 741
TUBE CLAMPS
Type "A" and "B"
steel and aluminum
immediate delivery

WITTEK
HOSE CLAMPS
We stock the
complete line

ALCOA
ALUMINUM RIVERS
Walls, Bonnets, Mats
and Special Parts.

CHERRY
BLIND RIVETS
We also have H
configuration tools.

maintenance and modification

Diets	
Laminectomy or	Q
diskectomy or	e
removal of	12
vertebrae to your	17

Testimonials
Our laboratory is fully equipped and technically staffed for all precision instrument repair and standard

Accessories
Facilities for servicing Stewarts, General Electric, Electrical New

IT IS BUILT ON NEW INSTRUMENTS, ACCESSORIES AND TEST EQUIPMENT

Standard Products Inc.

WHOLESALE DISTRIBUTORS FOR LEADING MANUFACTURERS
455 East Gilbert Phone 3-1431 Wichita, Kansas

They Didn't Wait for Subsidy

That pessimists, fighting, Flying Tiger, Robert W. Prescott, has put announced "the largest single purchase of new cargo planes" the air transport industry ever saw.

The Flying Tiger Line has ordered seven DC-6As to the tune of some \$7 million or more. The Tigers boast they already ran the world's largest freight and contract air fleet, and this new purchase will give them 44 planes. He hints at still other purchases.

"In the past year, we doubled the size of our fleet and our traffic tripled, rising from \$5 million to nearly \$16 million. That increase in fleet enabled us to meet an important part of the transport demand placed upon us by the expansion of the nation's military and industrial programs. With the addition of the DC-6A, plus other equipment which we may acquire in the meantime, we will be in an even better position to meet the steadily growing demands that exist in all parts of the world for freight and contract air service."

Those who contended to vigorously a few years ago that air cargo's future was a mirage must have been confused to read the other day that the Flying Tiger owned nearly \$1.4 million in the first year ended June 30. Furthermore, the Tigers' gross revenue in August hit \$1,973,000. That's a lot of business for an air transportation company certificated Aug. 2, 1949, to have cut for itself an non-subsidy money in a field that didn't even exist 10 years ago. That, gentlemen, is selling!

Even so, it doesn't require much of a memory to recall when Prescott told a Senate committee looking into mail subsidies earlier this year: "We are having to fight for every inch of the air through which we fly against the combined and bitter opposition of the entrenched passenger carrier."

Prescott's initiative and well-aided determination by men like Prescott and Earl Stoltz—who is steadily delivering of DC-6As—gave air cargo its birthright in this country. We are among observers who have shown believed that air cargo's potential exceeds that of the air passenger business.

Douglas Aircraft Co. has proven convincingly that it still stands first in air cargo's future. This company's initiative created the DC-6A, the first transport whose features have been specially designed for cargo. It then was adapted to the bigger DC-6B to passenger purposes with the DC-6B designation. But the A few months in 1949.

Douglas did not sit idly by while waiting for Uncle Sam to dole out subsidy dollars to build a bigger, faster, more modern cargo carrier. Despite uncertain business conditions of the 1940s era, Douglas went ahead on the DC-6A.

It was a typical American business success story that we don't read about in aviation as often as we should. After Douglas was in along with the project, the Air Force saw the value of the A and placed an initial order for 25; the Navy placed an order too. Commercial

orders for both Models A and B have been forthcoming in a steady stream, so that Donald Douglas told stockholders in the most recent annual report that the firm's development costs "have thus doubly been justified by both commercial and military commitments." He added, "I am confident that management's decision to go ahead with the DC-6A was sound and timely in the present emergency."

So the pioneering freight lines and military services have the benefit of a plane that is not just a handsome engineering drawing somewhere in a confidential prospectus, but a big, fast transport—in the Douglas firm's own words—"in large-scale production and capable of being still further accelerated to meet increased military and commercial demands."

Both the Flying Tigers and Douglas Aircraft are proving that commercial rethinking on a second project can still pay off.

Being Realistic Is Difficult

In AVIATION WEEK's lead news story Oct. 15 we reported that "unrealistic" military aircraft production schedules were to be cut.

One or two second edition Air Force officials took a dim view of our philosophy.

So last week our military editor, reporting both the coming cuts and "the other side," wrote in another lead story:

"According to [Undersecretary] Gilstrap, USAF is not including programs in more realistic proportions. There is no need for such a move, he says, because schedules are already in harmony with the military needs. Rather, he states, Air Force is revising delivery schedules in keeping with current and projected industry output capabilities."

"We'll have it to run. Who's realistic?"

It's Unpatriotic to Hurry?

Special plaudits sound the music in any business. A negative close-up view of the term obscures the forest. The New York Herald Tribune says shipping interests are interpreting a recent State Department order telling us personnel to travel by air instead of ship as a policy "directed against the American Merchant Marine."

The ship was up this controversy between the State Department and shipping interests in one time and money is dangerous "because we know better than any one else what ships mean to our nation when we come face to face with emergency."

We are the strongest Merchant Marine our military services want. If more subsidies are needed so it can do the necessary work then we should hand the subsidies over.

But if we come "face to face with emergency" we don't want our VIPs conducting the war at a 15-to-30-hour tempo. We don't think the American people do either.

—Robert H. Wood

Sperry Signal Source



operates
both low
and high
voltage
klystrons

new Microwave Instrument, Model 555

Klystron Signal Source, is an extremely well-regulated power supply.

It features a continuously adjustable beam supply from 120 to 3600 volts. In addition, a selector power supply is continuously variable from 0 to 1000 volts, and a control electrode supply is continuously variable from 0 to 300 volts. The versatility of this signal source permits operation of low voltage as well as high voltage klystrons.

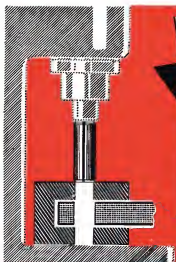
Several types of modulation are provided with this instrument: sine wave at 60 cps, 0-300 volts peak to peak, sine tooth wave continuously variable from 600 to 1600 cps, 0-360 volts peak to peak with 15 microsecond decay time, and square wave continuously variable from 600 to 1600 cps, 0-300 volts peak to peak with 5 microsecond maximum rise and fall time. A modulation selector switch on the front panel permits external choice of type of modulation.

Write our Special Electronics Department for further information on Model 555 as well as other Microwave instruments.

UNIVERSAL KLYSTRON WITH
MODEL 555 SIGNAL SOURCE

2022	3022	QK-277
2023	3027	QK-289
2026	7076	QK-290
2028	720A/E	QK-291
2029	720A/B/C	QK-292
2032	QK-140	QK-293
2029	QK-141	QK-294
2041	QK-142	QK-295
2042	QK-143	QK-306
2043	QK-159	4 EIA
2044	QK-236	5 EIA
2046	QK-237	5 EIA
2056	QK-246	5 EIA
2057	QK-259	5 EIA

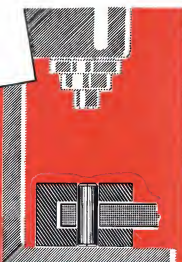
ROLLPINS... THE NEW IDEA IN FASTENERS



Rollpins are easily pressed into drilled hole—chamfered ends permit insertion by hydraulic or automatic hopper-fed press.



Rollpin compresses as they are driven—are self-locking in production-drilled holes... eliminate reaming and peening.



Rollpins fit flush, lock permanently in place. Constant spring tension against the walls of the hole fix Rollpins firmly in position.

How to eliminate rivets and set screws with Rollpin self-locking fasteners

Now put real fastener economy into your assembly procedure. With Rollpin metal fasteners as replacements you can eliminate many rivet and set screw applications and avoid the peening or threading operations which they require. One stroke of a press sets a Rollpin firmly in place, flush with the face of your assembly. This means real savings to you in costs and time.

It will pay you to investigate Rollpins for your product as a cost saving replacement for steel fastening pins, pivot or hinge pins, clevis pins, cotter keys, locating dowels, or shafts.

Rollpins exceed the shear strength of cold-rolled pins—are easily adapted to jig assembly or automatic hopper-fed

presses. They provide a firm vibration-proof fit until deliberately removed with a pin punch... and since Rollpins do not enlarge the hole, the same pin can be re-inserted with a hammer!

For details on Rollpins, write to Elastic Stop Nut Corporation of America, 2330 Vauxhall Road, Union, New Jersey.



**ELASTIC STOP NUT CORPORATION
OF AMERICA**



Rollpin acts as guide shaft for spring-loaded relay contacts. Inexpensively and simply pressed in place... riveting operation eliminated... it outwears previous brass rivet by ten times.



Rollpins replace set screws for pinning pulleys to shafts. Hole tapping operation is avoided and Rollpin holds tight against vibration until deliberately removed.



Rollpins are supplied to specified lengths with chamfered ends. They are available from stock in a wide range of lengths in diameters from 5/64" to 1/2" in Carbon and Stainless Steels.